Impact of PTA on Trade Margins of LDCs in Sub- Saharan Africa: Evidence from the EBA

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Abstract

This study investigates the impact of the EU preferential trade agreement of Everything but Arms on the extensive and intensive margins of exports of least developed countries in Sub-Saharan Africa. The extensive margin is defined as the quantity of exported products while the intensive margin is defined as the value of exported products. The study employs the difference-in-difference estimator together with fixed effects for a country bilateral product data defined at the HS 6-digit level to investigate the impact for the period 1995-2015. The findings are that the EBA has not had any impact on both trade margins of LDCs in SSA although it has impacted positively on some specific industries. The study goes further to explain how the LDCs in SSA could benefit from the EBA through complementary policies.

Keywords: trade margins, PTA, EBA, difference-in-difference, least developed countries

JEL classification: F13, F14, F15, O24, 055

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Content

1.0 Introduction

This study looks at the impact of the European Commission's (EC) Everything but Arms (EBA) preferential trade arrangement on the extensive margin and intensive margin of exports of Least Developed Countries (LDC) in Sub-Saharan Africa (SSA) at the country and product levels. It investigates the extent to which the total liberalisation of the European common market in terms of full tariff and quota removal has impacted on the market access of products originating from LDCs located in SSA. Furthermore, the study examines the role that complementary economic policies play in ensuring that Preferential Trade Agreements (PTA) and specifically the EBA affects positively the trade margins of LDCs.

Following, the EC's commitment to fulfilling the United Nations Conference on Trade and Development (UNCTAD) resolution to increasing the participation of developing countries in international trade, the EC as part of their Generalized System of Preference policy introduced the EBA as a one-way PTA to give 49 LDCs duty free and quota free market access in all European Union (EU) member countries for all goods originating from the LDCs except arms and ammunitions. The notion of using tariff removal or other types of trade liberalisation as done in the EBA is consistent with economic theory and is confirmed by several theoretical and empirical studies. Among the studies that confirm this is (Sala, Schroder, & Yalcin, 2010) which explains that tariffs are a major obstacle to foreign firms or products such that it makes it difficult for foreign firms and products to compete with domestically produced products. As a result, tariff cuts reduce risk of destination markets and this has a substantial impact on trade and country welfare as the reduction of risk alter the expected profits flows and thus affects the entry calculations of potential exporters. (Buono & Lalanne, 2012) confirm this empirically by showing that more firms export where tariff are lower. The EBA thus has the potential to influence export flows from LDCs to the European common market.

The support of the EBA by economic theory coupled with the expectations from both sides of the EBA agreement makes it an interesting case to investigate. The study thus employs a country bilateral data for all products exported by LDCs in SSA to the European common market in terms of their quantity measured in tons and their value measured in US dollars to estimate the impact of the EBA on the extensive and intensive margins of LDCs in SSA. The study uses the quasi

natural experiment methodology of difference-in-difference with the SSA LDCs being the treatment group and the other SSA countries, the control group to study the impact of the EBA for the period 1995-2015. The period of study coincides with the beginning of collection of the most detailed product description of exports to the latest available year. It is also chosen to allow for the use of the difference-in-difference methodology which requires information about the pre - treatment and post treatment performance of both the control and treatment groups. Also, the period of time is chosen to allow for better results following (Baier, Bergstrand, & Feng, 2014) who explains that the full impact of economic integration agreements on bilateral trade flows could take as many as 10-15 years to realize.

The definitions of the extensive and intensive margin follow (Disdier, Fontagné, & Mimouni, 2013) who defined the extensive margin as the quantity of products exported and the intensive margin as the value of exported products to study the effects of tariff liberalisation at the product destination level. The two margins of trade as defined above are very important in that, they are crucial factors for export growth. The extensive margin is said to be more crucial as it contributes more to export especially for developing countries (Besedeš & Prusa, 2011). They are also the trade creating channels as explained by (Foster-McGregor, Pöschl, & Stehrer, 2010) and (Bensassi, Márquez-Ramos, & Martínez-Zarzoso, 2010).

The study finds no significant impact of the EBA on neither the extensive margin nor the intensive margin at both the country and product levels. That notwithstanding, the study finds heterogenous impact for different countries and industries. The main findings are consistent with (Spilker et al., 2017) and (Gamberoni, 2007) both of which studied the impact of a PTAs on the export trade margins of developing countries including LDCs. Together with the findings above the study reveals the need for improvements in complementary policy if SS LDCs are to benefit from the EBA.

1.1 Review of Related Literature

The impact of PTAs on the extensive and intensive margins of trade has been widely studied in economic trade literature by means of different datasets and variables and as well as different econometric techniques and methodology. These studies have been PTA specific such as the GSP and the EBA while others have been general without any specific context. The findings of most of

these studies show both consistent and verifiable results which are in tandem with economic trade theory. Other findings have been controversial and have deviated from the predictions of economic theory and reasoning. The literature differs in some other ways too especially in their definition of the both margins of trade. This section provides the review of related empirical literature surrounding the subject matter.

The impact of PTAs including one-way and two-way PTAs and a number of economic integration agreements on the extensive and intensive margins of trade were studied by (Baier et al., 2014) using the gravity model and panel data methodologies of fixed effects for the period 1962-2000. They found that one-way PTAs have had negative but insignificant impact on the extensive margin of export while having a positive and significant impact on the intensive margin of export. By defining the extensive margin as the as the number of exporting firms and the number of products exported per firm and the intensive margin as export volumes per firm and per product (Spilker et al., 2017) investigated how Costa Rica's exports have been impacted by their entry into the Dominican Republic-Central American-United States Free Trade Agreement (CAFT-DR) using panel data methodologies with poisson regressions and difference-in-difference for the period 2000-2010. The findings reveal that CAFT-DR PTA has had no impact on the extensive and intensive margins at both the firm and product levels of analyses.

In the paper " Do Unilateral Trade Preferences help Export Diversification ?" (Gamberoni, 2007) measured the intensive margin as the value of trade of existing exporters and the extensive margin as the appearance and disappearance of exported products and investigated the impact of EU unilateral trade preferences on both margins of general and agricultural products for 118 countries during the period 1994-2005 using the gravity model together with the tobit and probit methodologies. The findings are that unilateral preferences for LDCs in general have not impacted on exports from LDCs. However, they have impacted positively on the two margins for agricultural products. In terms of specifics, the GSP and the African-Caribbean-Pacific (ACP) preferential treatment of the EU has had negative impacts on both export margins. (Gradeva & Martínez-Zarzoso, 2009) have specifically studied the impact of the EBA on export performance of LDCs and the comparison of the impact of the EBA with that of official Development Assistance (ODA) for the years 1995-2005 using 3 different econometric specifications namely panel data random and fixed effects estimators, the Hausman-Taylor estimator and the Heckman

regression model all of which reveal a poor performance of ACP overall exports under the EBA such that the size of ACP exports have decreased due to the EBA.

Irrespective of the largely negative and insignificant results generated by some studies of the subject matter, other studies have come out with positive results that are consistent with economic theory. These include (Foster-McGregor et al., 2010) who examined the impact of PTA membership on the volume and variety of exports for several countries for the period 1962-2000 using the gravity model together with the quasi natural experiment methodologies of difference-in-difference and matching. They find that exports are positively linked to PTAs especially the extensive margin and that PTAs are trade creating. (Scoppola, Raimondi, & Olper, 2013) reinforces this through their study of the impact of EU preferential policies on the extensive and intensive margins of trade in the agricultural and food industries of 173 exporting countries for the period 1990-2006. They rely on gravity equations together with ordinary least square, the Heckman selection model, and pseudo-maximum likelihood estimators to reveal that PTAs positively affect agricultural products at the extensive margin through measures other than tariffs. The intensive margins of the agricultural and food industries are not affected by policies other than tariffs. Finally, (Bensassi et al., 2010) sought to provide empirical evidence of PTAs on the two trade margins using the Euro-Mediterranean Agreement (EuroMed) as the setting. They employ the gravity model and panel data methodologies to investigate the topic for the period 1995-2008 and conclude that EuroMed positively and significantly affect both extensive margin and intensive margin which they define as the number of unique shipments and average value per shipment respectfully. They further reveal that the impact is positive and significant only for some sectors and that the general impact differs from country to country.

From the review of related literature, it is evident that the reduction and best the removal of trade protection at destination markets impacts on the export margins of trade. Since these two margins have been identified to be more important for the export growth of developing countries, a category which includes the LDCs, it becomes essential to study the case for these countries as the growth of the intensive margin might not be as beneficial as the extensive margin. The subject matter becomes very important even now as there has been new trade deals between the EC and some regions in SSA among which most of the LDCs belong to. The outcomes of the impacts of the EBA will be very important for the success of these new programmes that hope to use increased

foreign market access to influence export and consequently economic growth. Knowing the impact of the EBA on LDCs exports will be relevant for policy making to derive maximum benefits from the programme and other similar PTAs now and the near future.

The specific case of export contents and firm characteristics of African countries especially the LDCs makes it very interesting to investigate the impact of the EBA. LDC firms are usually small and informal as well as lack the technical capacity to perform well among other inefficiencies. This makes it very interesting to investigate the case of the LDCs to know if they will respond in the very same way that other non LDC countries have responded to tariff cuts on their export destination markets. The prices of some exports of LDCs are also determined on the world market such that tariffs may not be the only factor that determines their market access but their prices as well. From the above, it becomes very interesting to investigate the impact of the EBA on the margins of trade of LDCs in SSA.

1.2 Objective of the Study

The aim of the study is thus to investigate the impact of the EBA tariff and quota removal at the country and product levels. Specifically, it seeks to know the impact of the EBA on the extensive and intensive margins of LDCs in Africa using a difference-in-difference approach.

The study shall add to the existing literature surrounding the subject matter as it is the only study dedicated to finding the impact of EBA on the extensive and intensive margins of exports of LDCs in SSA. It is also the first to use a difference-in-difference methodology to examine any sort of impact of the EBA. The findings of this study will be of importance to policy makers' especially those of LDCs as it will afford them the opportunity to improve on their export growth and to development partners of LDCs to know of further actions to take towards helping the development agenda of LDCs.

The rest of the study is organized as follows; focus on Everything but Arms, data and data source, descriptive statistics and analyses of SSA Exports which seeks to throw lights on the dynamics of SSA exports. These are followed by the methodology, the econometric specification of the model, results, policy recommendation, limitations of the study, prospects for future studies, and conclusion.

1.3 Everything but Arms (EBA)

Under the Generalized System of Preferences (GSP) initiative agreed in 1968 at the United Nations Conference on Trade and Development (UNCTAD), developed countries were tasked to extend unilateral and non-reciprocal preferential trade treatment to developing countries. Among the several GSPs that emerged out of the UNCTAD agreement is the European Union (EU) GSP. According to the European Commission (EC) trade portal of the GSP updated on the 24th day of February 2017 the GSP "allows developing countries to pay less or no duties on their exports to the EU". The GSP thus "gives them vital access to EU markets and contributes to their economic growth".

The EU GSP however, applies to a select list of product lines to which total or partial tariff ad quota removal are applied. In all about two-thirds of product lines originating from developing countries fall under the general GSP programme. The EU GSP is however a dynamic policy, in that it is subject to changes such that based on the competitiveness of the product line, the product could be withdrawn from the list of supported product lines. Also under the EU GSP are special arrangements including arrangements that provides additional tariff reductions for countries that adhere to international labour rights standards as enshrined by the international Labour Organisation as well as international environmental standards. These extra arrangements under the EU GSP are therefore conditional and developing countries that want to benefit of it are required to apply to the EU for consideration. Their request is granted or denied following a thorough study of their specific case by authorities of the EC. The general EU GSP programme is thus limited in terms of product scope and country qualification.

Starting the 5th of March 2001, the European Commission introduced the Everything but Arms (EBA) arrangement under the EU GSP. The EBA is a special arrangement made under the GSP exceptionally for Least Developed Countries (LDCs) according to the United Nations Classification of countries based on the socio economic and human development level of countries. Countries with the least development ratings fall under the LDC banner. The EBA is different from the standard GSP arrangement such that it is not time restricted and that countries benefit of it in so far as they remain or become LDCs. The objective of the EBA arrangement according to its originators is to" facilitate the integration of least developed countries in the world economy and in international trade as well as to promote economic growth in countries and well-being

among people". Currently, there are 49 LDCs across the globe with most of them, approximately 34 found in the Sub-Saharan region of Africa (SSA). Nine of the LDCs are found on the Asian continent, 5 in the Australian and Pacific region and 1 in the Caribbean. The number of LCDs has increased by 1 from the start date of the EBA with the inclusion of Senegal which became an LDC in 2002 having accepted a downgrading to LDC status.

According to an EC press release issued in Brussels on the 7th of February 2001, and numbered IP/01/116, the EBA provides full access to the EU common market for all goods originating from LDCs except arms. As detailed in the press release, all goods coming from LDC starting from the commencement year of the arrangement will be subject to total liberalisation in the sense of duty free and quota free access to the European common market.

Even though the EBA arrangement allows for all products but arms to be exported into the EU market, three (3) sensitive products namely Sugar, Rice and Fresh Bananas were exempted from full liberalisation until later. The 3 products were subject to Zero tariffs but still restricted in terms of the quantity that could be exported to the EU common market. These quota regimes were however transitional and were fully removed in 2006 for fresh Bananas and 2009 for both Rice and Sugar. A study titled "Post-Quota EU Sugar Sector" published by the Directorate-General of Internal Policies of the EC to the European Parliament in 2016 reveals several reasons for which sugar as a commodity was subject to a quota regime until the 1st of July 2009. According to the referenced document, sugar is of great economic and environmental importance to most agricultural regions of the EU such that its immediate liberalisation would create economic, social and environmental shocks. It cites reasons of employment and income, animal feed, source of energy, food security, need to sustain biodiversity as well as need to keep agricultural land in good condition as reasons for which the product could not be liberalized immediately. Sugar was hence protected from the LDCs between 2001 and 2006 and gradually liberalized with increased quota for LDCs after 2006. It was fully liberalized for the LDCs in 2009. Similar arguments hold for both Banana and Rice.

2.0 Data and Data Sources

In response to the objectives of the study, the study uses the Base pour l'Analyse du Commerce International (BACI, 2015) data by the French Centre d'Etudes Prospectives et d'Informations Internationales and constructed by (Gaulier & Zignago, 2010). The BACI database comprises the reconciled version of country bilateral exports and imports reported to the Trade Statistics Branch of the United Nations Statistics Division and used in the United Nations COMTRADE database. Overall, the database has information on the bilateral export values and quantities for more than 200 countries and 5000 different products. The bilateral export values and quantities are measured in thousands of US dollars and in tons respectfully. Products are classified at the World Custom Organization's Harmonized System (HS) 6-digit level which is the most standard and detailed product definition.

3.0 Descriptive Statistics

From the selected study period and countries, there are 4797 uniquely identified products exported by the selected 42 countries in SSA to the EU 15. Of the total number of uniquely identified products, 4559 products were exported by the EBA treated countries while the non EBA treated countries exported 4555 different products. A total of 4390 different products were exported by the two groups of countries before the introduction of the EBA in 2001. The number of exported products increased to 4637 the years after the implementation of the EBA by both group of countries. The treated countries exported a total of 4342 different products after the implementation of EBA. This is however lower than the number of different products they exported prior to the start of the EBA.

Table 1 shows the summary statistics of the two key variables of interest; Export Quantity which measures the extensive margin of export, and Export Value which measures the intensive margin of export. The table shows specific statistics of mean and standard deviation for all countries of SSA included in the study and by group classification according to their EBA treatment status. In all there are 528,648 bilateral observations of which 265,977 belong to the treated countries while the remaining 262,671 belong to the non-treated countries.

Table 1: Summary Statistics of Export Quantity and Value by Treated and Non-Treated Countries

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	(1) All		(2) Treated		(3) NonTreated	
	mean	sd	mean	sd	mean	sd
Value	1710.487	42719.56	1199.323	26945.69	2228.084	54195.53
Quantity	3388.64	113372.8	2920.535	114034.5	3864.132	112695
EBA	.5031268	.4999907				
N	528648		265977		262671	

Source: Author's Calculation

Column 1 indicates the mean and standard deviation of quantity and value of exports for the full sample of countries used for the study. The average value of products exported to the EU 15 by the full sample of countries for the period 1995-2015 is 1710.487 thousand US Dollars while the average quantity of product quantity exported is 3388.64 tons. This suggests that the quantity of products exported is about two times the value of the products exported by the full sample of countries involved in the studies and as such SSA countries export products which are likely to be of lower value relative to their quantities. For both margins, a little more than half of the mean are due to the exports of SSA LDCs included in the EBA arrangement whiles the remaining contribution comes from the rest of SSA countries that are included in the study. The Standard deviation statistic measures how much the countries in the full sample of study differ from the mean values of export values and quantity. It shows that country's export quantities and associated values are very large and far from the mean of export value and quantity. This means that there are a wide range of values for both margins and that they are spread out from the mean values. Specifically, the standard deviation of export value shows that most of the export value observations are 42719.56 thousand US dollars more and less of the mean value of 1710.487 thousand US dollars.

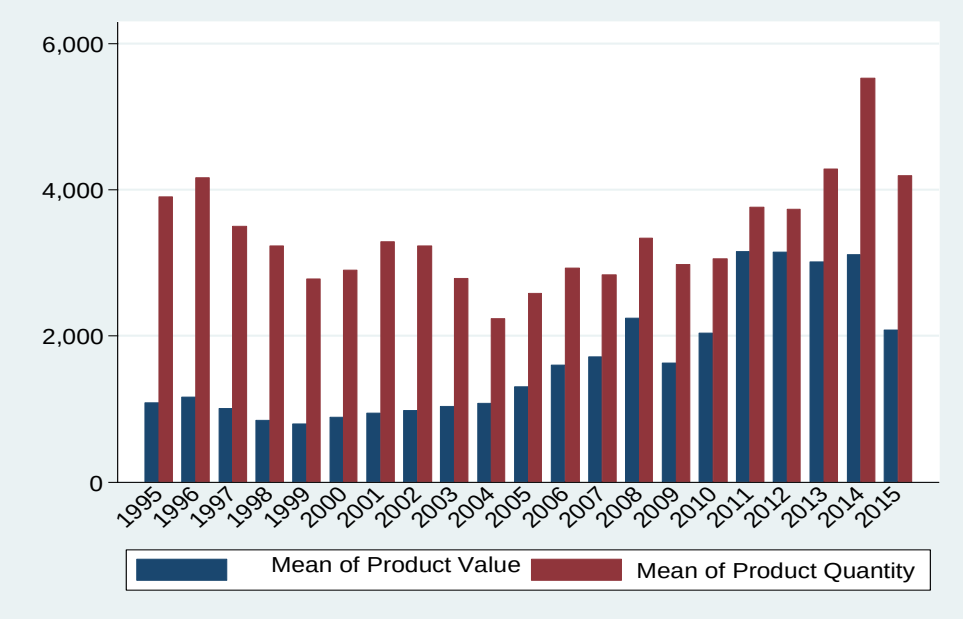
Columns 2 and 3 show the mean and standard deviations for the treated countries and non-treated countries respectfully. The average export value of all products exported by the EBA countries to the EU 15 from 1995 to 2015 is 1199.323. This is roughly about a half of the average of export

value of all products exported by the EBA non-treated countries in SSA which is approximately 2228.084 thousand US dollars. For export quantity, the non-treated countries exported a total of 3864.132 tons of products which is more than the quantity exported by the EBA treated countries which is 2920.535 tons. As indicated by the standard deviation, the export value of products exported by the non-treated countries are highly spread away from their average values than that of the treated countries. For export quantity, the extent of variation from the mean for both groups are almost equal with treated countries having a standard deviation of 114034.5 and non-treated countries having a figure of 112695.

3.1 Analyses of SSA Export Products

Figure 1 shows the mean values of products exported by SSA countries measured by their monetary value and quantity from 1995-2015. The value of all products exported by SSA countries has increased over time since 1995 except in 2009 and 2010 possibly due to the global financial crises which caused EU 15 countries to reduce their import of products originating from all parts of the world including SSA. The value of exported products from SSA to EU 15 increased soon after 2010 to its highest level in 2011 and 2012 amongst the years under consideration. Nevertheless, the value of SSA exported products to EU 15 fell to the lowest level in four years in 2015. The quantity of products exported by SSA countries to the EU 15 has been volatile and highly undulating across the period of study. The quantity of exported products has experienced peaks in 1997, 2013, and 2015. The year 2014 recorded the highest number of product quantity exported by SSA to the European common market. The years 2004 recorded the lowest number of product quantity exported by SSA to the EU 15. Contrary to the experiences with products values in the years of the global financial crises, the quantity of products exported to the EU 15 by SSA countries were rather higher. Overall, across time, the quantity of products exported by SSA countries to the EU 15 is greater than their corresponding monetary value. This suggests that SSA countries export mostly lower value products even though they export more in quantity

Figure 1: SSA Export Product Quantity and Value by Year

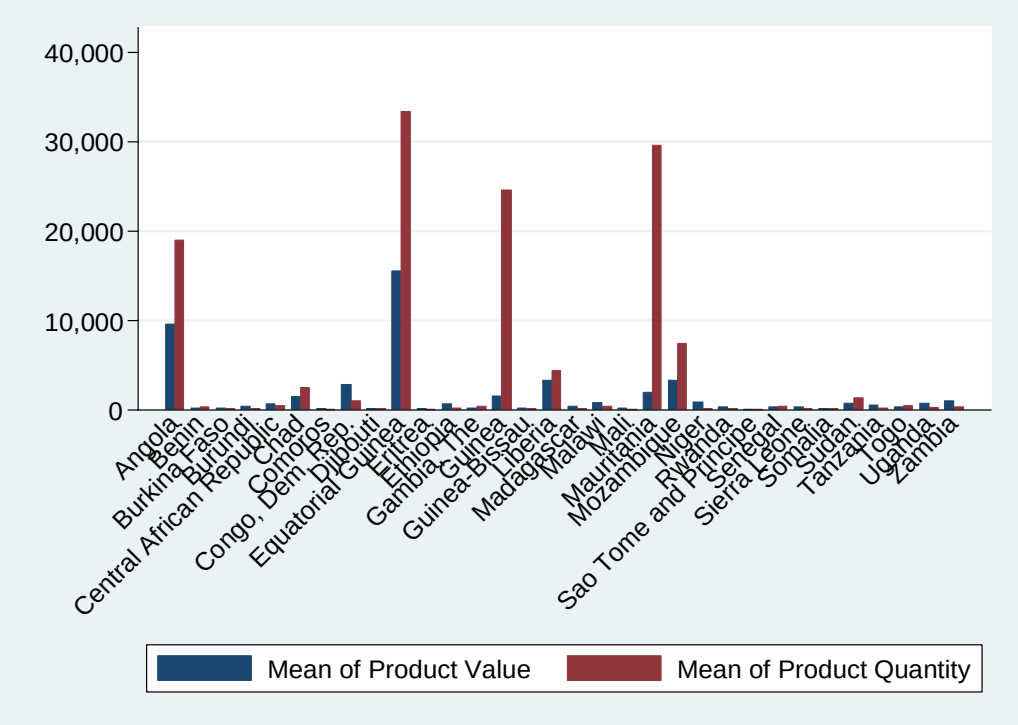


Source: Author's Calculation

Figures 2 and 3 below illustrate the quantity and value of all products exported from SSA to the EU 15 by LDCs and non LDCs for the period of study. With reference to figure 2, most LDCs in SSA export relatively small quantity of products which are of lower value compared to the non LDC countries in SSA. The only exceptions are Angola, Equatorial Guinea, Guinea, Liberia, Mauritania, and Mozambique whose exported product quantity and values are comparable to those of the non LDC SSA countries as shown by figure 3. Once again, value of exported products is more than the quantity of the exported products for both groups of countries. Among the non LDC Countries, Nigeria is a super high exporter of products that tend to have very high monetary value as well. The quantity and value of Nigerian exports are about four to five times more than the exports of all the countries in both the LDC and group of non LDC countries. Most of the countries are very much comparable to the LDCs in terms of the value and quantity of products they export to the EU 15. As a matter of fact, they export products quantities and product values that are far less those exported by the top exporters in the group of SSA LDC countries.

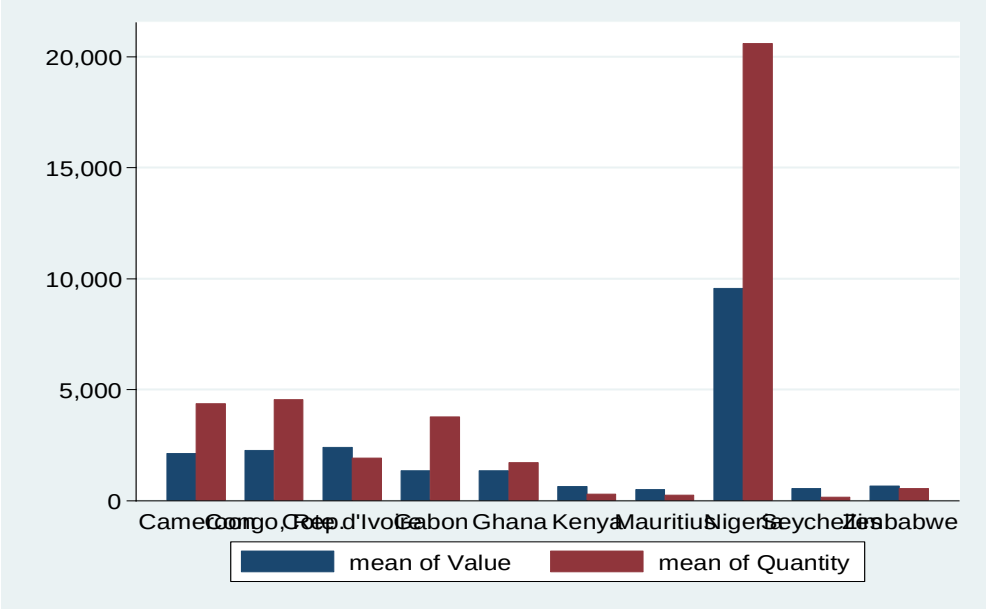
Although the EU 15 is a common market, member countries differ in several ways. These differences between the EU 15 countries could be due to differences in their individual economy

Figure 2: SSA LDCs Product Exports in Quantity and Value



Source: Author's Calculation

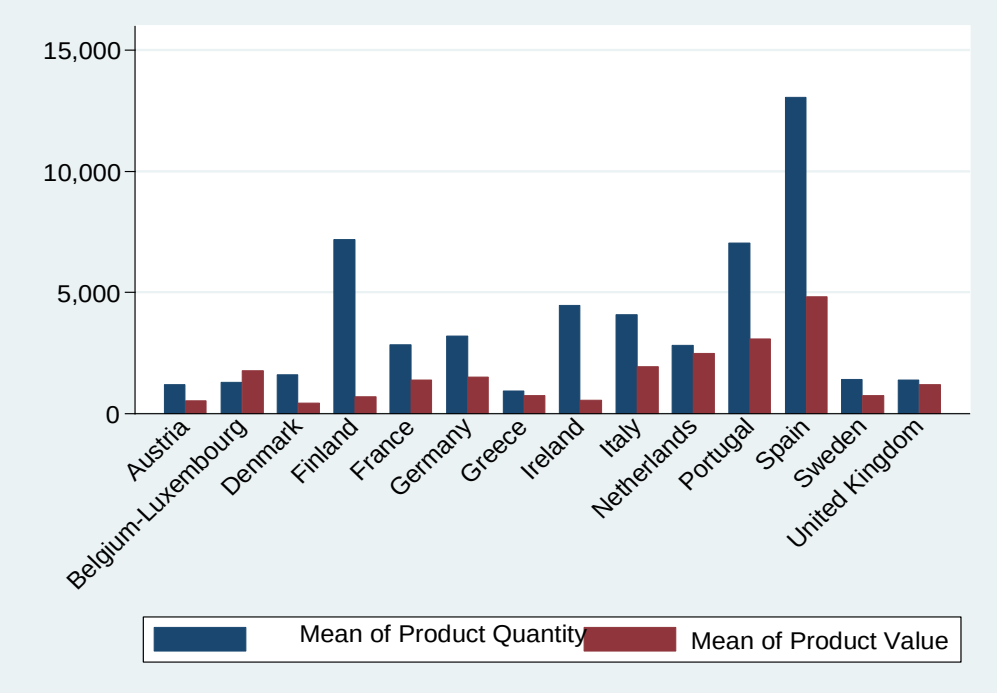
Figure 3: SSA Non LDCs Product Exports in Quantity and Value



Source: Author's Calculation

including differences in income as well as differences in social and demographic characteristics including taste and population. Spain has imported the most quantity of products with their associated high monetary values from SSA between 1995 to 2015. Spain is closely followed by Finland, Portugal, Ireland, Italy, Germany, France and Netherlands in descending order of magnitude. Surprisingly, the top importers of heterogenous products from Africa as measured by the quantity and value of different products imported are not the richer countries in Europe. Germany, France, and the United Kingdom are bigger economies in terms of income than Spain, Portugal and Ireland but then they import less quantity of products unlike the later. Figure 4 illustrates the immediate discussed phenomenon which is the quantity and value of products imported by EU 15 from SSA.

Figure 4: Product Quantity and Value by Importer (EU 15)

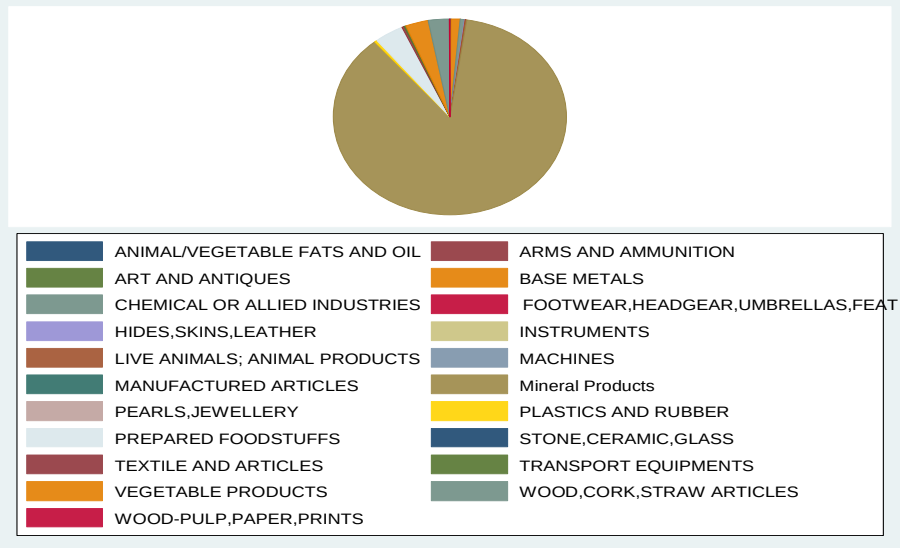


Source: Author's Calculation

The quantity of products exported from SSA to the EU 15 as well as the value of products vary by industry. Using the HS 2002 classification of products, the variation of quantity of products exported by SSA to the EU 15 from 1995 to 2015 is illustrated by a pie chart in figure 5. Mineral product exports dominate by a wide margin the quantity of products exported by SSA countries.

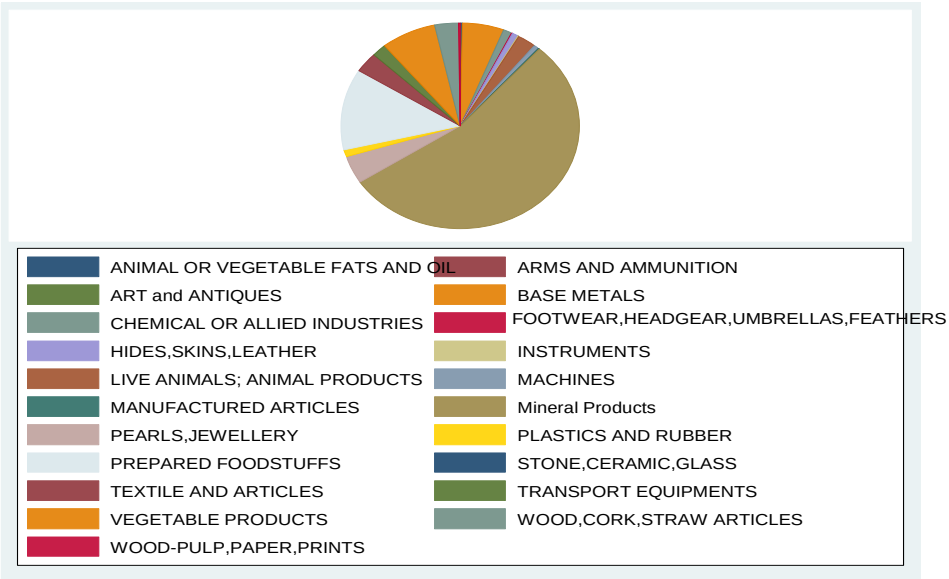
It represents about 80% or more of total product quantities exported. Other groups of products such as Vegetable Products, Prepared Foodstuff (which consists of Beverages, Spirits and Vinegar; Tobacco and Manufactured Tobacco Substitutes.), Wood and Articles of Wood; Wood Charcoal;

Figure 5: Distribution of SSA Product Quantity by Industry



Source: Author's Calculation

Figure 6: Distribution of SSA Product Value by Industry



Source: Author's Calculation

Cork and Articles of Cork; Manufactures of Straw, of Esparto or of other Plaiting Materials; Basket Ware and Wickerwork, and Base Metals and Articles of Base Metal have a relatively higher share of exports in terms of their quantities exported. The remaining 16 industries have an almost insignificant quantity out of the total quantity of products exported by the SSA.

Figure 6 shows the variation of SSA product export by value. Unlike in figure 5, the mineral product industry contributes just about a half to the total value of SSA product exports. The value of Prepared Food Stuff, Vegetable Products and Base Metals are higher relative to the quantity exported of these commodities. The case is true for Textile and Articles, Arts and Antiques, Live Animals and Animal Products, as well as Wood, Cork, and Straw Articles.

By income classification, the variation in exported product value and quantity by LDC and non LDC status, reveals an unsurprising outcome. The pattern of product value and quantity exported by the SSA in general is not different from the pattern of exported product value and quantity of the LDCs and the non LDCs in SSA. Appendices 1 – 4 illustrate the variation of exported product quantity and value by both LDCs and non LDCs in SSA.

4.0 Methodology

4.10 Difference-in-Difference Methodology

The study employs a difference-in-difference methodology to investigate the impact of the EBA arrangement on LDCs in SSA. The difference-in-difference methodology is an impact evaluation methodology that is usually used to investigate the impact of a quasi-natural experiment such as this study. (World Bank Group & IDB, 2016), discusses the concept of difference-in-difference as follows:

"The difference-in-differences method compares the changes in outcomes over time between a population that is enrolled in a program (the treatment group) and a population that is not (the comparison group). This allows us to correct for any differences between the treatment and comparison groups that are constant over time."

Difference-in-Difference thus compares the difference in an outcome between two units made

distinct by the participation of one in a programme by comparing the difference overtime (before and after the treatment) for each unit and then the difference of the difference derived overtime between the two units. This difference is then explained as the impact of the programme on the unit of population that participated in a programme or treatment. This is widely considered as true since the methodology provides a counterfactual in the comparison group also known as the control group whose outcome is assumed to be outcome of the treated unit or group had the treated group not been involved in a supposed programme or treatment. As such, it is required of the two groups to be comparable in terms of their outcome before the treatment to be able to attribute the difference of the difference between the two units or groups to the programme or treatment.

The discourse by (World Bank Group & IDB, 2016) as shown above underlines a possible weakness of the difference-in-difference methodology. This is the fact that the methodology only controls for differences that are constant over time. The study thus complements this weakness by controlling for several time varying differences between the two groups compared in the study and the destination countries of their product exports.

4.20 Selection of Treatment and Control Group of Countries

Owing to the nature of the difference-in-difference method of impact evaluation, the study uses two groups of countries in SSA as treated group and the comparison or control group. By default, the treated group consists of SSA LDCs that benefit from the EBA arrangement with the European Commission. The control group consists of the remaining SSA countries who do not benefit from the EBA arrangement because of their income and development Status. Most of the countries that belong to the control group are lower-middle income countries. Six countries in SSA are however dropped from the list of treated and control countries for reasons due to the structure of the BACI data which is used for the study as well as the assumptions of the difference-indifference methodology. Specifically, countries belonging to the Southern African Custom Union (South Africa, Namibia, Botswana, Lesotho and Swaziland) are dropped the reason being that their exported product quantity and value are aggregated. Since four out of five of the countries are non LDCs and the remaining one (Lesotho) is an LDC, it becomes difficult to know the exact group the Southern African Custom Union should belong to. Another country that is omitted from the study is Cape Verde. This is because Cape Verde transitioned from Least Developed Country status

to Lower-Middle Income status in 2007. As a result, Cape Verde no longer received special EBA treatment from the European Commission making it impossible to look at the impact of the treatment on Cape Verde together with the rest of the SSA countries. Since Cape Verde transitioned in 2007 and the study period lasts until 2015 which is more than 7 years after their transition, the inclusion of Cape Verde could drive the results and thus cause biasedness of the estimate.

One final issue about the treated countries is that of Sudan. Geographically, Sudan is found in the North of Africa and as a matter of fact lies in the Sahara zone of the African continent. However, Sudan does not possess the characteristics of the North African nations and since it is an LDC, it is included in the group of treated countries. In 2011, a new nation of South Sudan was born out of Sudan making the number of LDCs in SSA increase by one. For the sake of continuity and to avoid and reduce attrition, product exports in terms of their quantity and value of South Sudan are added to those of Sudan and the two countries are treated as one country; Sudan.

To sum up, the study has a total of 42 SSA countries out of which 32 are LDCs and belong to the treatment group. The 10 remaining countries make up the control group. Since the study uses bilateral data, the destination countries are the EU 15 countries but with Belgium and Luxembourg put together as one entity as built by the CEPII BACI database. Appendix 5 shows a list of the treated, control and EU 15 countries.

4.21 Justification of the Control Group

A requirement to avoiding biased results in a difference-in-difference study is the quality of the control group. According to (Gerther et al, 2010), the quality of the control group determines the quality of the evaluation. Put differently, the success of a difference-in-difference evaluation is tied to the quality of the counterfactual which is seen in the control group. For this reason, it is important to have a very good control group to trust the outcome of this study. Although it not always the case, the parallel trend graph, which is shown in the next section provides proof of the quality of the control group. This study goes further to analyze the characteristics of the control group vis-à-vis the characteristics of the treatment group to assure the quality of the chosen control group. It is the authors view that there are not very significant differences in the two groups of countries although they have been designated different development statuses by the United

Nations.

First among the justifications is the fact that some non LDC countries in SSA by all standards meet the classification of their economy as least developed. However, these countries have refused the classification of their economies by citing the inaccuracy of the data from which the decision to downgrade their economies were reached. Two countries from the control group namely, Ghana and Zimbabwe are cited as having met LDC status and therefore the need to recognize and accept their befitting status (UN, 2016).

The second point of justification concerns mineral product exports from SSA which is mostly attributed to countries such as Nigeria, Ghana, and Gabon all of which belong to the control group of countries. This common view is held since Nigeria and Gabon are some of the world's top crude oil producers and belong to the prestigious group of Organisation of Petroleum Exporting Countries (OPEC). Ghana, formerly known as the Gold Coast is one of the world's top gold exporters. However, the treatment group has several top minerals producing and exporting countries including Angola, which is an OPEC member country and hold the prestigious title of being Africa's second largest producer and exporter of oil after Nigeria and one of the top 10 in the world. Angola produced 1755 and 1725 thousand Barrels per day (tb/d) in 2015 and 2016 respectively whiles Nigeria produced an equivalent of 1839 and 1557 tb/d in 2015 and 2016 respectfully (OPEC, 2017). Hence, they are not very different in terms of the oil production and yet they belong to the different groups. Other top oil producing countries among thee treated group are the Democratic Republic of Congo, Equatorial Guinea, Sudan, and Chad.

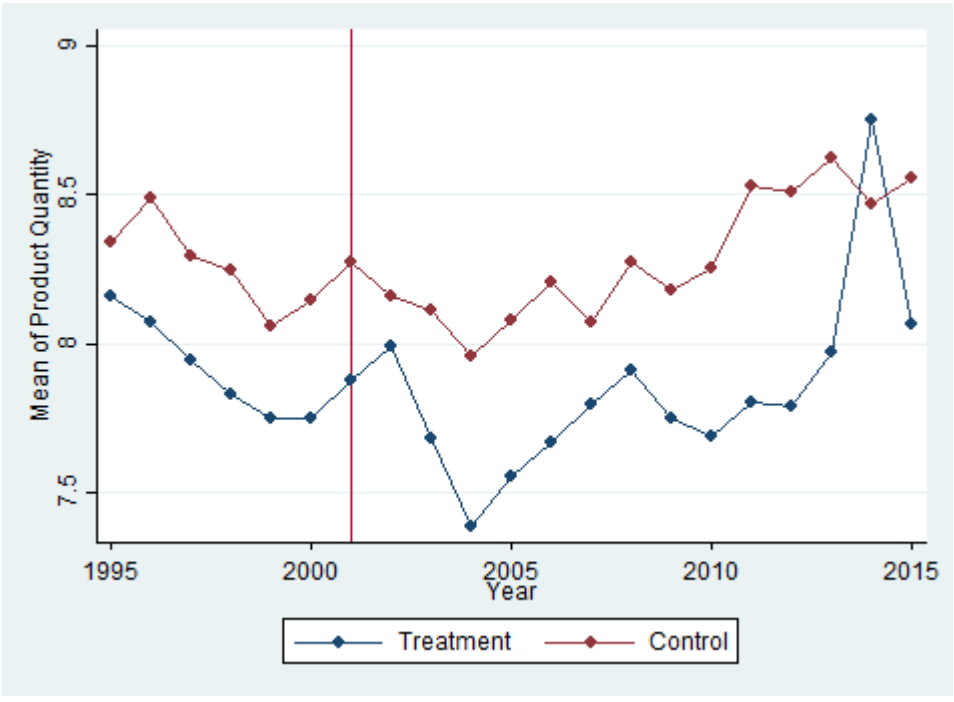
The third point of justification of the choice of the control group is the fact that SSA countries do not differ with respect to their productivity from both the agricultural and manufacturing sectors. Due to their reliance on mineral products, most SSA countries suffer from the problem of the Dutch disease such that they tend to neglect the other sectors especially the manufacturing sector. The issue of low productivity in SSA countries is also due to their relatively poor business environment and firm characteristics such as low human capital development, inadequate access to manufacturing inputs, limited infrastructure, macroeconomic environment and regulation volatility and inefficient government policies (Tybout, 2000) and lack of technical capacity to perform as well as reliance on labour intensive production due to technological differences

(Söderbom & Teal, 2004). Also they suffer from low or poor management practices resulting from lack of competition and the existing ownership structure (Bloom, Mahajan, McKenzie, & Roberts, 2010). Appendix 6-9 is an illustration of mineral product and non-mineral export by the treatment and control group of countries.

4.3 Parallel Trend Assumption

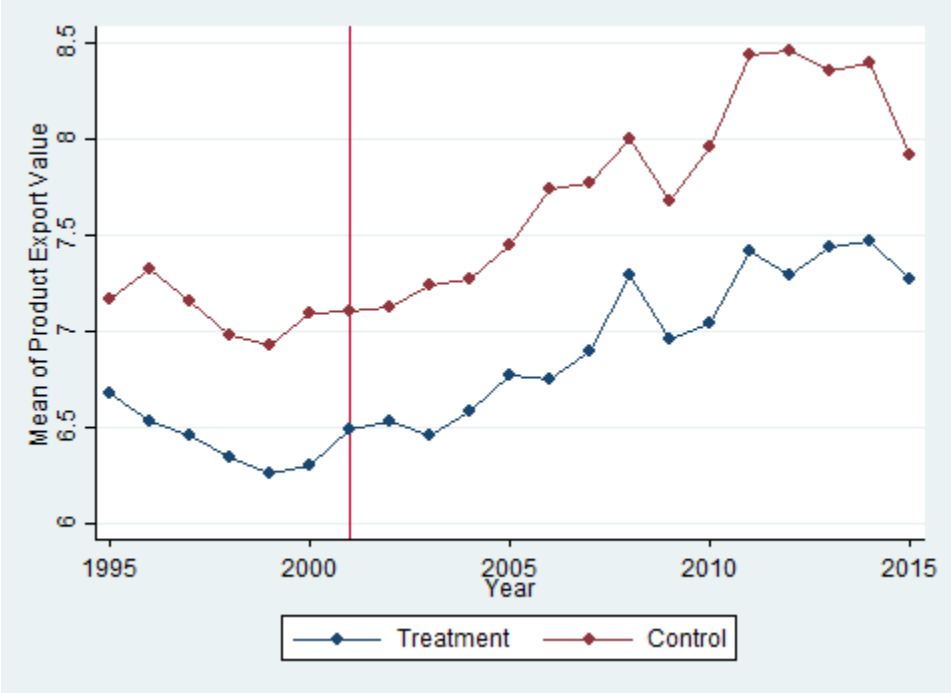
An important assumption of the difference-in-difference methodology is the Parallel Trend Assumption which is also referred to as the Equal Trend Assumption (World Bank Group & IDB, 2016). The assumption postulates that groups ought to have the same trend prior to the start of the treatment so that the two groups can be assumed to be equal or same. By this assumption, changes in the trend of the treated after the treatment is attributable to the treatment. The parallel trend also shows the counterfactual of the treatment group which is assumed to be the outcome of the treatment group in the absence of the treatment. The counterfactual in this case is the trend of the control group after the treatment. Figures 7 and 8 show the parallel trend graphs of the treatment group and control group at the country level.

Figure 7: Parallel Trend Graph for Exported Product Quantity at Country Level



Source: Author's Calculation

Figure 8: Parallel Trend Graph for Exported Product Quantity at Country Level



Source: Author's Calculation

From both trend graphs, the treatment group and the control group have a similar trend prior to the start of the EBA arrangement in 2001 which is indicated by the red vertical line that cuts through both graphs. The trends for the non-treated years before 2001 are almost a perfect one but for a mirror reflection for the years 1995-1996 where there was a rise in the quantity of products as well as value of products exported by the control group whiles those of the treatment fell by almost the same margin.

The years following the commencement of the EBA programme exhibit an almost perfect trend or correlation for both groups for the value of their exported products. Surprisingly, even with the market access EBA programme, the treatment countries or group saw the value of their exported products behind that of the control group just like it used to be before the start of the EBA. Regardless, their exported products value increased to levels more than the years before the EBA. With respect to exported product quantities, the trends are undulating with some ups and downs for both groups. The quantity of exported products of the treated groups fell to a very low level

between 2002-2004. The level rose after that period and eventually overtook the quantities exported by the treatment countries in 2014 only to fall again to levels below the control group in 2015.

The fall in importation of products from SSA countries by EU 15 countries seems to be due to factors at the global level including a fall in demand of global demand and specifically of trade in fuels which is the one of the major component of African mineral exports. Other factors that could have caused a fall in African exports are the rise in prices of oil and non-oil fuels, and exchange rate depreciation of currencies of major industrial countries. According to (WTO, 2003), reduced investment flows, dented business confidence, increased restrictions on international trade transactions to reduce risk from terrorism, and rising global tensions among others are contributory factors to the fall in global trade including African Exports.

Country differences is not the only heterogeneity that the EBA brings to the SSA-EU trade. The EBA prescribed transitional liberalisation for some three products namely Sugar, Fresh Banana, and Rice until later and as a result it becomes pertinent to investigate the impact on all products using these three products as controls. Due to the difference in the duration of transition for these three products, three different controls (Sugar-Rice, Banana, and Arms) are used to study the parallel trend of the EBA at the product level. Appendices 10-13 show the trend graphs for two controls at the extensive and intensive margins.

4.40 Econometric Specification of the Difference-in-Difference Model

The econometric estimation of the difference-in-difference methodology of both the evaluation of the EBA at the country and product levels is given in general difference-in-Difference literature as:

$$Y = \alpha + \beta Treat + \gamma Time + \delta(Treat * Time) + \mu \quad (1)$$

Where: Y = Outcome variable (quantity or value of product exported)

$Treat$ = 1, if the country or product benefits from EBA arrangement

= 0, if otherwise

$Time$ = 1, if year is a post EBA treatment period

= 0, if otherwise

*Treat*Time* = 1, if both *Treat* and *Time* are equal to 1

= 0, if either *Treat* or *Time* is equal to 0

u = Error term

β, γ, δ = Coefficients to be estimated

α = Intercept

Following (Álvarez & López, 2008), the Baseline model (1) is enhanced to control for several time varying unobserved characteristics of countries and products that could have influenced the outcome variables. This specification is given as model (2).

$$Y_{pct} = \alpha + \beta Treat_{ct} + \delta_p + \delta_c + \delta_t + e_{pct} \quad (2)$$

Where: Y_{pct} = Outcome variable for product *p* in country *c* at time *t*.

δ_p = Vector of Product fixed effects

δ_c = Vector of country fixed effects

δ_t = Vector of time fixed effects

However, owing to the bilateral nature of the dataset, the model (2) is modified to control for both specific and bilateral time varying unobserved factors as demonstrated in (Baier et al., 2014).

The study follows (Chang, Kaltani, & Loayza, 2009) who used variable complementarity to investigate the impact of interested independent variables on a dependent variable by interacting complementarity variables with the variable of interest. The study uses the interacted variable approach to explain the impact of policy complementarity on the EBA arrangement towards fulfilling the objectives of the EBA by generating better and significant results. To achieve that goal, models (1) and (2) are adjusted to include policy variables and their interaction with the EBA treatment variable. The model specification of the complementarity study is given as model (3).

$$Y_{pct} = \alpha + \beta_0 Treat_{ct} + \beta_1 \Delta_{ct} + \beta_2 Treat_{ct} * \Delta_{ct} + \delta_p + \delta_c + \delta_t + e_{sct} \quad (3)$$

Where: Δ_{ct} = A vector of policy variables

$Treat_{ct} * \Delta_{ct}$ = interaction of EBA treatment variable and policy variables for country c at time t

5.0 Results

To investigate the impact of the EBA arrangement on the LDC countries, the baseline model (1) is estimated at the country level. This is done by eliminating the 3 products that were exempted from full liberalisation until the end of their transitional liberalisation. Also eliminated are arms and ammunitions that by the EBA arrangement are exempted from tariff free and quota free market access in the EU 15. This is done to allow for the countries, both the treated and control countries to be comparable at the country level. Two separate regressions are estimated at the country level to analyze the impact at on both the extensive and the intensive margins of export. The difference-in-difference estimator as built in the STATA statistical package is employed for this estimation.

Model (1) is equally estimated by means of the difference-in-difference estimator to investigate the impact of the EBA arrangement at the product level. Since there exist three separate timelines for the products that are gradually liberalized, three different set of control groups are used. The first set of control group for the product level analyses is a group which consists of Sugar and Rice Products. The number of years involved with this first set of control group is limited to the years before 2010. This is because the control group members became liberalized after 2009. The second control group comprises fresh banana which was not fully liberalized until 2006. Just like it is done for the first control group, the estimation with the second control group is restricted to years before 2007. The third control group consists of the chapter 93 product line of the HS 2002 product classification which is arms and ammunitions. Since this product line has never been fully liberalized, the years involved when the control group at the product level is arms and ammunitions are the full range of years and thus goes until the very last year of the dataset which is 2015.

In each product level estimation, the control groups are mutually exclusive with member products of other control groups such that the use of sugar, and rice in the control group rules out the presence of banana and Arms in the treatment group. Likewise, the use of banana as a control group rules out the presence of rice and sugar and arms in the treatment group. In the case using arms and ammunitions as the control, all 3 non-fully liberalized products are exempted from the treatment group.

The model (2) is estimated to account for combinations of country specific, country bilateral, time, and product fixed effects to capture time-varying unobservable factors. Tables 2 and 3 show the baseline and fixed effects results for the extensive margin and intensive margin respectfully at the country level.

Table 2: Baseline and Fixed Effects Estimation Results for Extensive margin at the Country level

	(1) DD	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE
Time Dummy	-0.588***					
	(0.01)					
Country Dummy	-0.137***					
	(0.02)					
EBA Treatment	-0.038*	-0.250***	-0.276***	0.014	0.014	0.037
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.04)
Constant	1.090***					
	(0.01)					
Importer x Year	No	Yes	Yes	Yes	Yes	Yes
Product x Year	No	No	Yes	Yes	Yes	Yes
Product x Exporter	No	No	No	Yes	Yes	Yes
Exporter	No	No	No	No	Yes	Yes
Exporter x Importer	No	No	No	No	No	Yes
R-squared	0.007	0.042	0.656	0.758	0.758	0.765
N	515611	515611	498491	472897	472897	472896

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's Calculation

5.1 Country Level Results

The result for the extensive margin from the baseline difference-in-difference evaluation is shown in column 1 of table 2. The EBA arrangement seems to have an unexpected negative and significant impact on the quantity of products exported by the LDCs in SSA. Specifically, the quantity of products exported by LDC in SSA has been reduced by 3.8 percent due to the EBA arrangement which has been put in place to increase EU market access to products originating from LDCs including those in SSA. The result is in tandem with the results of the parallel graphs as discussed previously. However, the associated R-squared is low and this calls for the inclusion of some more variables as the EBA alone has a weaker explanatory power on the results as derived by the

difference-in-difference estimator.

Table 3: Baseline and Fixed Effects Estimation Results for Intensive margin at the Country level

	(1) DD	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE
Time Dummy	-0.107***					
	(0.01)					
Country Dummy	-0.176***					
	(0.01)					
EBA Treatment	0.048***	-0.160***	-0.235***	0.031*	0.031*	0.049
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)
Constant	3.094***					
	(0.01)					
Importer x Year	No	Yes	Yes	Yes	Yes	Yes
Product x Year	No	No	Yes	Yes	Yes	Yes
Product x Exporter	No	No	No	Yes	Yes	Yes
Exporter	No	No	No	No	Yes	Yes
Exporter x Importer	No	No	No	No	No	Yes
R-squared	0.001	0.021	0.445	0.607	0.607	0.620
N	525106	525106	507833	481987	481987	481986

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's Calculation

As a result, model (2) is estimated by including several fixed effects to model (1) to control for possibly all variables that seem to have been omitted in this relationship. The fixed effects included are Importer-Year fixed effects (column 2), Products-Year fixed effects (column 3), Products-Exporter fixed-effects (column 4), Exporter fixed effects (column 5), and Exporter-Importer fixed effects.

Importer-Year fixed effects are included to control for factors in the importer countries which are the EU 15 countries that vary over time and could have impacted on demand for products from SSA countries. These factors include income and population both of which are direct determinants of product consumption. Product-Year fixed effects control for such factors that impact on products such as a boom in a specific product industry and even their factors of production such increased rainfall, irrigation, and research and development.

Product-Exporter fixed effects control for such factors in the exporter countries that impact on the export of products including transportation and other infrastructure, improved capital and labour and general business environment and a lot more. Exporter fixed effects controls for exporter specific factors such as income, population, resource endowment, governance and macroeconomic environment. Finally, exporter-importer fixed effects controls for bilateral factors between the exporting countries and importing countries such as foreign direct investments from the importer to the exporting countries, and exchange rates.

The gradual imposition of the various fixed effects increases the associated R-squared and the impact of the EBA arrangement on the quantity of products exported by SSA LDCs from a significant negative impact to a positive but insignificant impact. This suggests that changes in the quantity of products exported by SSA LDCs overtime are attributable to other factors other than the EBA arrangement and that the EBA has no impact or whatsoever on the quantity of products exported by SSA LDCs.

The results for the intensive margin is shown in Table 3. The difference-in-difference estimator as shown by column 1 provides a positive and significant impact of the EBA arrangement on the value of products exported by SSA LDCs to the EU 15. However, the inclusion of the fixed effects as done for the extensive margin erodes the significance of the EBA treatment and thereby suggests that the EBA has no impact on the value of products exported by the LDCs in SSA contrary to the objective of PTAs and economic and trade theory in general.

Overall, the EBA seems to have no impact on both margins of trade at the country level. However, since the dynamics within individual countries and as well industries could differ from that at the regional level, it becomes pertinent to look at the evaluations in terms of the specific effect of the EBA on each country and industry. Appendices 18, 19, 20 and 21 show the country specific and sector specific results.

The country specific results show variations and heterogenous impact of the EBA on the extensive and intensive margins of SSA LDCs exports. While the impact is negative and significant for most of the LDCs it is positive and significant for some countries including The Gambia for the

extensive margin and Central African Republic, Djibouti, Mozambique and Sierra Leone. At the industry level, the EBA has heterogenous impact on the two margins just like it does at the individual country level. Largely, the EBA has a negative but significant impact on most industries except Vegetable Product, Live Animals and Animal Product, Pearls and Jewelry, and Footwear, Headgear, Umbrellas and Feather industries for both margins.

The heterogenous nature of the impact of the EBA on both margins for both the country and industry levels calls for the investigation of specific reasons as to why some countries and industries benefit while others do not. It is the author's opinion that specific factors that exist in specific countries and industries have led to these positive impacts and thus the need to conduct complementarity analyses of the EBA on the two margins of export.

5.2 Product Level Results

The results for the difference-in-difference estimator together with those for the fixed effects estimations are shown for the extensive margin and intensive margin respectfully. Tables 4 and 5 show the results for which sugar and rice are used as the control group.

Table 4: Impact of the EBA on the Extensive margin at the Product level (Sugar -Rice as Control)

	(1) DD	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE
Time Dummy	-0.099					
	(0.18)					
Product Dummy	-4.026***					
	(0.14)					
EBA Treatment	-0.371*	-4.334***	-53654.882	3428.024	3478.588	7002.738
	(0.18)	(0.11)	(1.06e+09)	(44607590.65)	(44607590.64)	(14356998.56)
Constant	5.050***					
	(0.14)					
Importer x Year	No	Yes	Yes	Yes	Yes	Yes
Product x Year	No	No	Yes	Yes	Yes	Yes
Product x Exporter	No	No	No	Yes	Yes	Yes
Exporter	No	No	No	No	Yes	Yes
Exporter x Importer	No	No	No	No	No	Yes
R-squared	0.011	0.044	0.665	0.773	0.773	0.781
N	358438	358438	345859	322262	322262	322257

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's Calculation

From table 4, column 1 shows the results for the difference-in-difference estimator while columns 2, 3, 4, 5, and 6 show the results for the various fixed effects as explained previously. The impact of the EBA on the extensive margin for exported products is negative and significant such that the EBA reduces the quantity of products exported by the LDCs to the EU 15. To be specific, the EBA reduces the quantity exported by SSA LDCs by 37.1% at the 5% significance level. However, just like at the country level, the impact by the difference-in-difference estimator vanishes when the fixed effects as explained are imposed such that the EBA impact turns positive but insignificant. Therefore, at the product level when the control group consists of sugar and rice products, the impact of the EBA on the extensive margin is negative. From Table 5, the impact on the intensive margin is shown. The difference-in-difference estimator provides a negative but insignificant coefficient. The coefficient of the EBA treatment remains unchanged after the control of all the other factors that are likely to impact on the outcome of the coefficient. As a result, the EBA has no impact on the intensive margin of trade of SSA LDCs

Table 5: Estimation Results for the Intensive margin at the Product level (Sugar and Rice as Control)

	(1) DD	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE
Time Dummy	0.020					
	(0.12)					
Product Dummy	-2.014***					
	(0.09)					
EBA	-0.131	-2.121***	56804.764	6882.200	7117.305	2070.830
	(0.12)	(0.08)	(9.98e+08)	(40080190.90)	(40080190.88)	(23589655.50)
Constant	5.024***					
	(0.09)					
Importer x Year	No	Yes	Yes	Yes	Yes	Yes
Product x Year	No	No	Yes	Yes	Yes	Yes
Product x Exporter	No	No	No	Yes	Yes	Yes
Exporter	No	No	No	No	Yes	Yes
Exporter x Importer	No	No	No	No	No	Yes
R-squared	0.004	0.023	0.443	0.617	0.617	0.631
N	366949	366949	354221	330331	330331	330326

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's Calculation

The estimation of the impact at the product level with the other two sets of control groups which are made up of fresh banana on one hand and arms and ammunitions on the other hand provide the

same results as given by the sugar and rice group. Hence, with such a consistent result using 3 different set of control groups, it is can be concluded that the EBA has not impacted on both the extensive and intensive margins measured at the product level. Appendices 14-17 show the results of the EBA for both the extensive and intensive margins using banana and arms and ammunitions the control groups respectively.

5.3 Complementarity Analyses

Following the derivation of a rather unexpected insignificant impact of the EBA on the extensive and intensive margins of SSA LDC exports, the study goes a step further to investigate several complementary policies that SSA LDCs could implement to benefit from the EBA arrangement. It is the believe of the author that the LDCs have not benefited from the EBA with respect to their trade margins because of the existence of inefficiencies in their individual economies and not necessarily that the EBA as a market access policy is ineffective. LDCs, like their name suggests are the poorest among all countries and as such do not have the best of resources to facilitate trade. The study thus investigates how the improvement in key factors as infrastructure, human capital, physical investment, and financial access could increase the quantity and value of products that LDCs export to the European common market.

Infrastructure is very relevant for the production process from the start to the delivery of the products final consumers. Hence, infrastructure in such sectors as transportation is crucial for the export business such that its improvement would lead to an increase in the quantity of products that are exported to destination markets ceteris paribus. Transportation infrastructure includes road networks, airports, railway networks and sea ports. To explore the complementarity link of infrastructure with the EBA, the study resorts to the mobile cellular subscription data from the World Bank's World Development Indicators (WDI) to proxy infrastructure.

Physical investment in this context refers to all forms of physical assets apart from those involved in transportation. Such investments include machinery and plants and all sort of capital that go into the production process including buildings and vehicles. Physical investments work the same way as described for transportation infrastructure above. Physical investment is proxied by gross capital physical formation data from the WDI.

Human capital is one of such inputs of the production process that is indispensable. From the theory of marginal physical productivity, human capital is directly linked to production such that the higher the level of human capital accumulated by an individual or country, the more productive they become ceteris paribus. Human capital for this complementarity analyses is measured by the total secondary school enrollment of countries.

Financial access is included in the policy complementarity analyses for the simple reason that there exists a high financial requirement in the export business. This financial requirement is due to the presence of such costs as shipment cost, and insurance. As a result, only firms that are financially sound can export and vice versa. The analyses use domestic credit provided by financial sector (% of GDP) data from the WDI to measure a country level of financial access.

Model (3) is used to investigate the complementarity impact of these policies on the EBA towards realizing improvements in the extensive and intensive margins of LDC exports. Tables 6 and 7 present the results for the extensive and intensive margins respectively for model (3) using the policies variables described above.

Tables 6 and 7 show the coefficients for the EBA treatment variable, the policy variables and those of their interaction with the EBA treatment variable. As discussed, the interaction variables which indicate the presence of those policies in the EBA regime are all positive and significant. This indicates that the EBA arrangement would impact on the extensive and intensive margins of the SSA LDCs in the presence of improved and increased transportation infrastructure, other physical investments, increased human capital accumulation and increased access to finance to meet the financial requirements of production and export. The net effect of the interaction variables and the EBA treatment variable are however negative and this signifies the need for aggressive improvements in these policy areas to ensure positive impact of the EBA on the margins of trade.

Figures 9, 10, 11, and 12 illustrate the marginal effects of the EBA on the trade margins in the presence of these policies.

Table 6: Estimation Results for Complementarity Impact of the EBA on the Extensive Margin

	(1) Extensive Margin	(2) Extensive Margin	(3) Extensive Margin	(4) Extensive Margin
EBA	-1.404***	-0.406***	-3.168***	-2.105***
	(0.07)	(0.02)	(0.10)	(0.04)
EBA*Investment	0.367***			
	(0.02)			
Investment	-0.510***			
	(0.01)			
EBA*Infrastructure		0.055***		
		(0.01)		
Infrastructure		-0.119***		
		(0.00)		
EBA*Human Capital			0.778***	
			(0.03)	
Human Capital			-0.668***	
			(0.01)	
EBA*Credit Access				0.530***
				(0.01)
Credit Access				-0.432***
				(0.01)
Constant	2.200***	0.937***	3.133***	2.197***
	(0.03)	(0.01)	(0.05)	(0.02)
R-squared	0.007	0.011	0.011	0.011
Observations	495907	501063	315317	489665

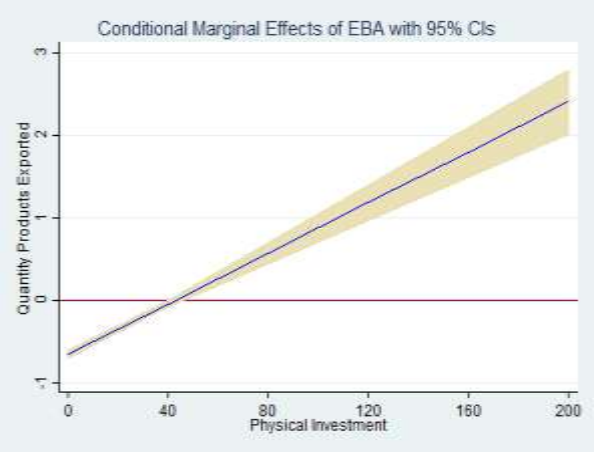
Table 7: Estimation Results for Complementarity Impact of the EBA on the Intensive Margin

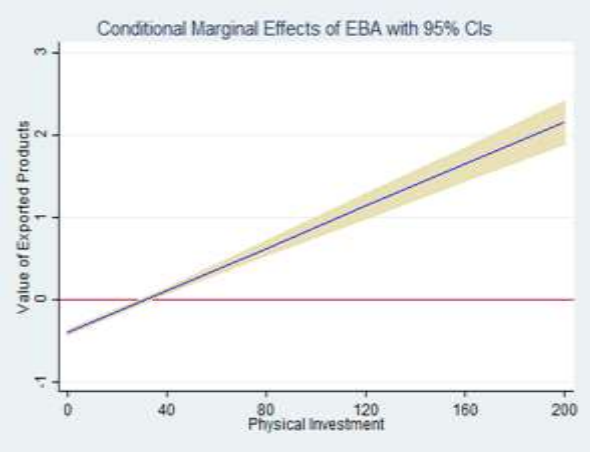
	(1) Intensive Margin	(2) Intensive Margin	(3) Intensive Margin	(4) Intensive Margin
EBA	-0.887***	-0.234***	-0.950***	-0.381***
	(0.05)	(0.01)	(0.07)	(0.03)
EBA*Investment	0.255***			
	(0.02)			
Investment	-0.131***			
	(0.01)			
EBA*Infrastructure		0.039***		
		(0.00)		
Infrastructure		-0.011***		
		(0.00)		
EBA*Human Capital			0.251***	
			(0.02)	
Human Capital			-0.062***	
			(0.01)	
EBA*Credit Access				0.072***
				(0.01)
Credit Access				-0.076***
				(0.00)
Constant	3.378***	3.028***	3.183***	3.256***
	(0.02)	(0.00)	(0.03)	(0.02)
R-squared	0.002	0.001	0.001	0.001
Observations	504746	509862	321078	498833

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's Calculation

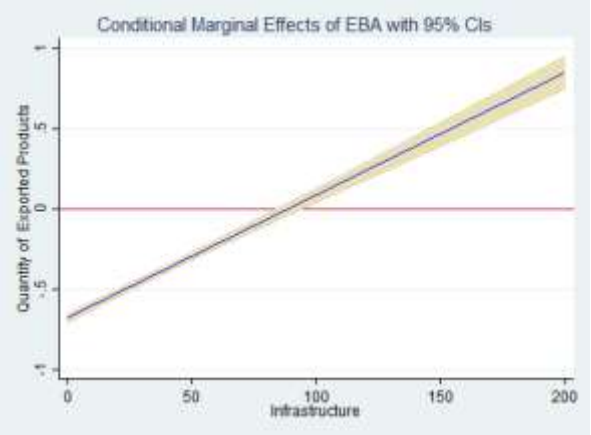
Figure 9: The Conditional Marginal Effects of the EBA in the Presence of Investments

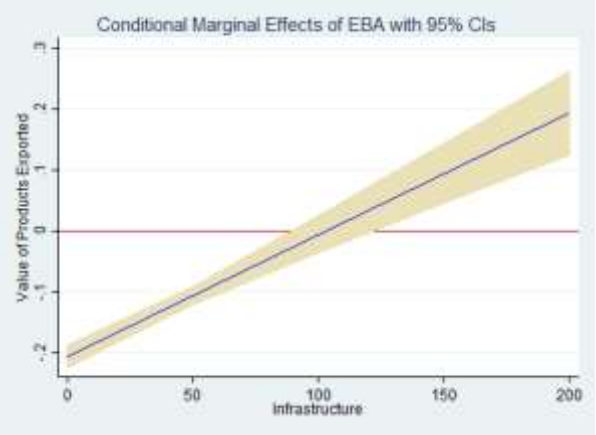




Panel A: Extensive Margin **Panel B: Intensive Margin**

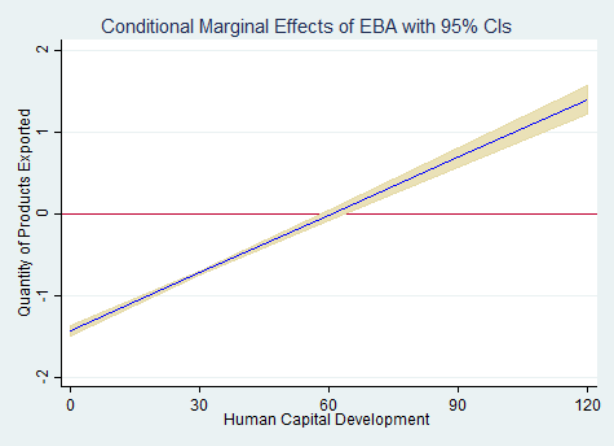
Figure 10: The Conditional Marginal Effects of the EBA in the Presence of Infrastructure

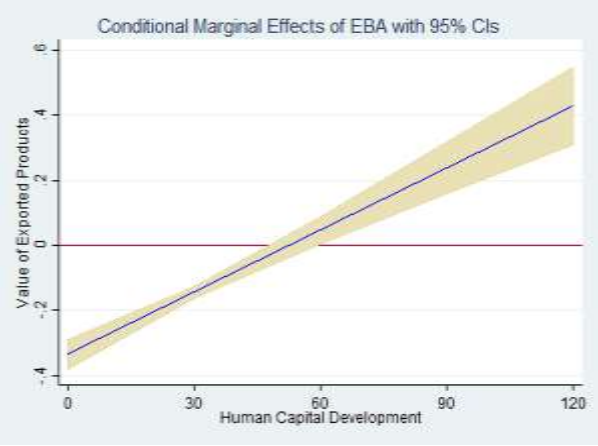




Panel A: Extensive Margin **Panel B: Intensive Margin**

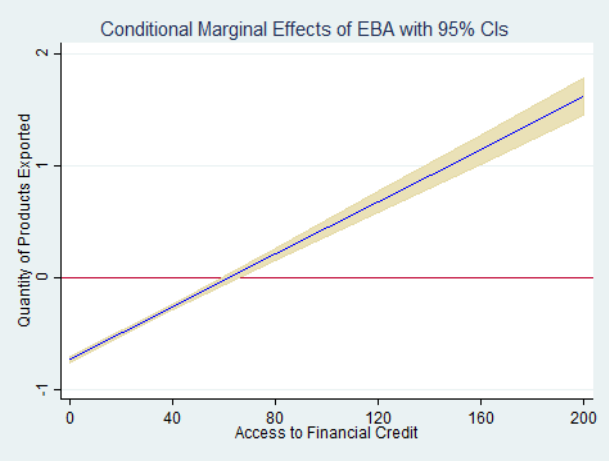
Figure 11: The Conditional Marginal Effects of the EBA with Human Capita Development



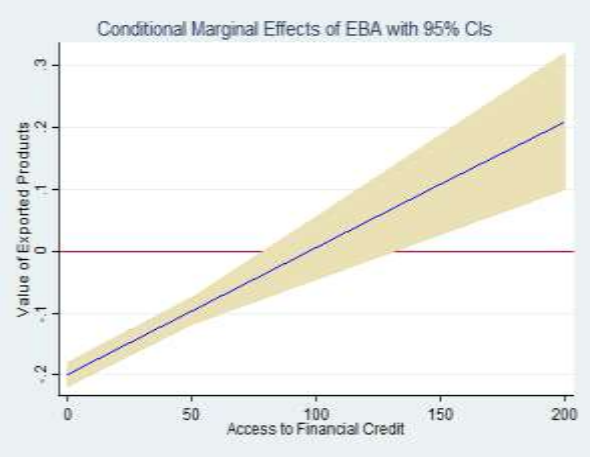


Panel A: Extensive Margin **Panel B: Intensive Margin**

Figure 12: The Conditional Marginal Effects of the EBA with Credit Access



Panel A: Extensive Margin



Panel B: Intensive Margin

The above marginal effect figures show the complementarity effect of four policy variables and EBA on the extensive and intensive margins of SSA LDC exports. To summarize, the EBA can have a positive and significant impact on the trade margins of SSA LDCs but only in the presence of some policies which happen to be above a certain threshold as illustrated above in the figures at the point of intersection of the red horizontal line and the positively sloping blue line. Therefore, SSA LDCs should improve on some trade related policies including those discussed above so that they can benefit from an improved extensive and intensive margin owing to the EBA.

5.4 Discussion of Results

Following the econometric estimations above, it has been shown that the EBA has not impacted on the extensive and intensive margins of LDCs in SSA both at the country and product levels. The difference-in-difference estimator provides a negative impact of the EBA on the extensive margin while it provides a positive impact on the intensive margin. However, the difference-in-difference estimator controls only for factors that are constant overtime such that the fixed effect estimator was used to control for several time-varying factors leading to the rather surprising result of no impact of the EBA. This could be due to several factors including low standards and quality of exports of SSA LDCs which makes their products restricted from the EU market even though there exists free entry into the market.

Regardless of the outcome of the difference-in-difference and fixed effect estimations, the impact of the EBA has been shown to vary among countries and industries with some countries experiencing a positive impact while others experienced a negative and insignificant impact. This called for an investigation into the factors within those countries that could lead to a positive impact of the EBA on the trade margins of LDCs in SSA. The resulting complementarity analyses shows that the EBA has the capacity to affect the trade margins of the LDCs in SSA if and only if they improve their production and export capacity to a level that would allow them to respond to the tariff free and quota free European market access that the EBA guarantees. It is the belief of the author that the EBA has not impacted on the extensive and intensive margins due to the nature of their economies as LDCs. As a result, an improvement in policy environment to ensure human capital development, infrastructural development, access to financial credits and increased physical investment would allow the extensive and intensive margins of exports of SSA LDCs to respond the EBA.

The results are consistent with (Spilker et al., 2017) who found no significant impact of the Dominican Republic-Central American-United States Free Trade Agreement on Costa Rican exports to the USA and (Gamberoni, 2007) who found that unilateral trade preferences do not impact on exports from LDCs.

5.5 Robustness Tests

Several reasons as identified with the study could lead to biased results owing to endogeneity. The sources of endogeneity identified include that which arises due to the selection criteria of countries and the groups used for the difference-in-difference impact evaluation. The first reason is that country selection was not randomly done. Member countries of the two groups were selected based on their income status as LDCs and non LDCs and not for any other reason. Also, the LDC countries and even the EBA policy itself were implemented due to the prior success of similar programmes elsewhere. Due to these reasons, there could be biased results which might not necessarily reflect the impact of PTAs in general.

Secondly, there could be an omitted variable effect such that some relevant factors that affects the outcome variables are left out of the analysis. This could lead to an incorrect outcome for the

analyses.

Thirdly, the results could be driven by the dominance of mineral products especially from the control group as well as Nigeria which happens to be a super exporter among the SSA countries and as a result an outlier.

For these reasons, the study checks the robustness of the results by dropping Nigeria and mineral products from the analyses. Finally, some control variables including the gravity model variables of distance, common language, and colonial relationship between the origin and destination countries are added. Other variables apart from those of the gravity variables are included.

The results for both the extensive and intensive margins are robust to the inclusion some more control variable including distance between countries, common language, colonial relationship, infrastructure in the exporting country as well as political rights and population of both importer and exporter. The results remain insignificant for both margins except that that of the intensive margin changes sign from positive to negative. Appendix 22 shows the results for the inclusion of control variables.

The results are also robust to the exclusion of an outlier country in the country group which is Nigeria. Results for both margins are robust as shown in appendices 23 and 24. The results are also robust to dropping mineral products, a product which dominates by a huge margin in both groups.

5.6 Limitation of the Study

The study is limited to an extent by the choice of impact evaluation methodology which is the difference-in-difference. This methodology limited the study to only the EU -15 countries as bilateral trade partners of SSA countries in the EU common market. This is because the membership of the EU has changed since 2001. As a result, the methodology could not afford to include the new member countries since their market did not allow free entry of LDC exports. Their inclusion would therefore lead to an upward bias of the impact of the EBA. Another limitation to the study comes from the BACI database. The data aggregates the export values and quantity of five SSA countries of different income status into one: The South African Custom

Union (SACU). Since the methodology requires the use of different groups and the data puts these five members of the different statuses together, the data reduces the sample size of the study by 5 countries as these countries are eliminated to make possible a difference-in-difference evaluation. It is the authors view that the inclusion of more EU countries and the SACU countries to the sample size could boost the validity and reliability of the results.

5.7 Directions for further studies

The study attributes the insignificant impact of the EBA to missing policy complementarities in the LDCs in SSA. However, this is not all that there as other factors could be responsible and thus calls for further research into the causes of the low response of SSA LDC exports to the EU market. A rule of origin was included in the EBA in 2009. Since LDCs depend on intermediate inputs and more to produce their final products, it will be interesting to investigate the impact of the rule of origin as prescribed in the EBA on extensive and intensive margins of the trade of LDCs.

5.8 Conclusion

The study sought to investigate the impact of the EBA on the extensive and intensive margins of export of LDCs in SSA to the EU market. It employed a difference-in-difference methodology together with the fixed effects estimator as well as the BACI bilateral exports data for thirty-two LDCs in SSA, ten non LDCs in SSA and 15 EU countries to investigate the topic for years 1995-2015. The study finds no impact of the EBA on the 2 margins of trade of the LDCs in SSA both at the country level and product level. It however finds heterogenous impact of the EBA on individual countries and industries such that it proceeds to do a complementarity analyses to know the existence of some factors that causes a favorable outcome for some countries and industries and unfavorable outcomes for others. Following, a complementarity study of some policy variables, the study recommends to LDCs in SSA to improve their state of physical investment, human capital, credit access, and infrastructure to benefit from the EBA.

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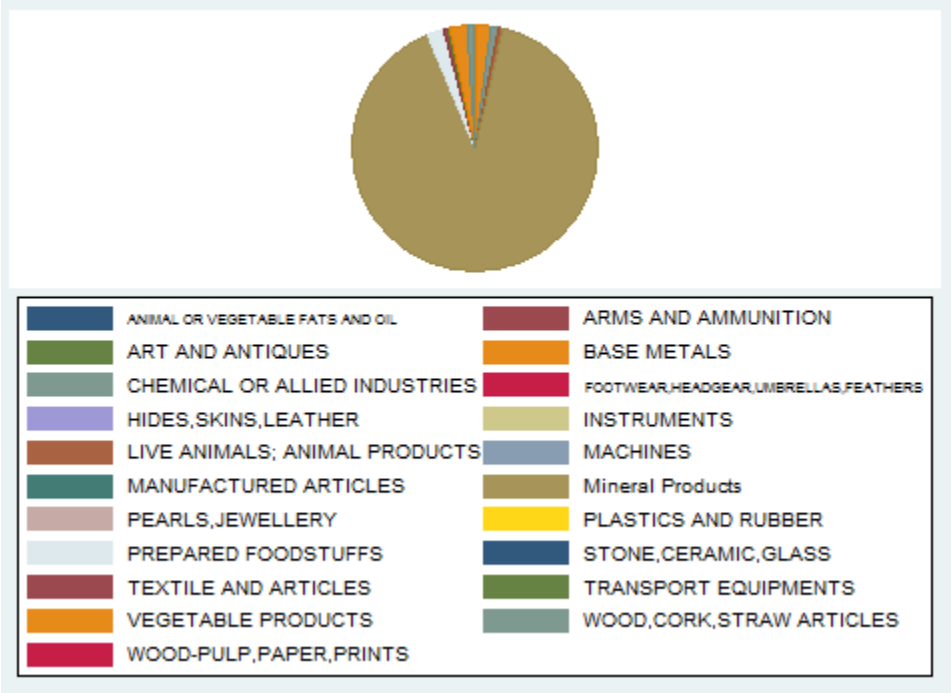
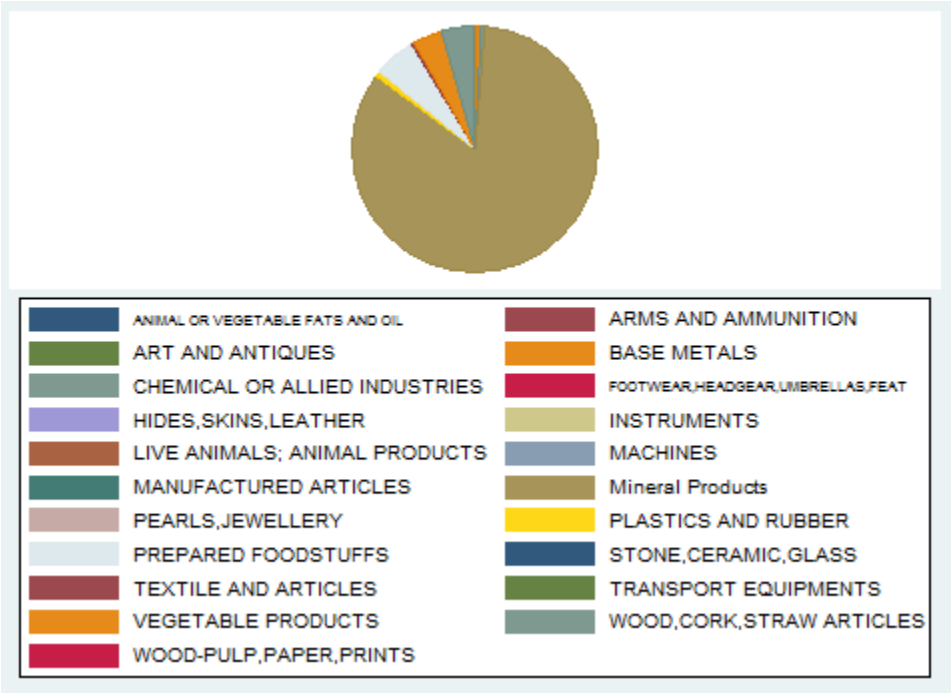
Appendix 1: Distribution of LDC Exported Product Quantity by Industry



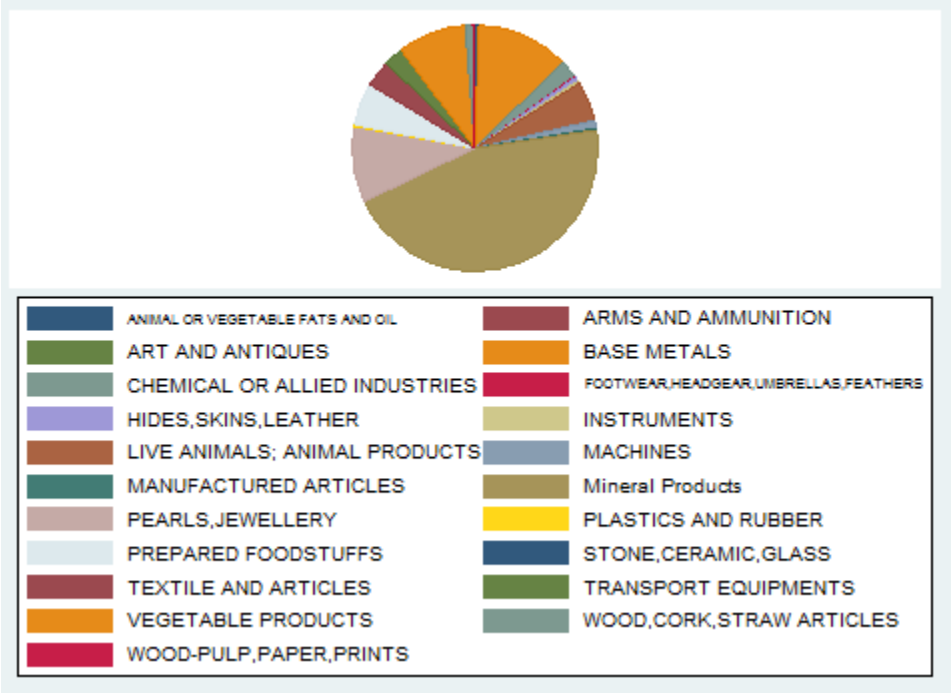
Source: Author's Calculation

Appendix 2: Distribution of Non LDC Exported Product Quantity by Industry



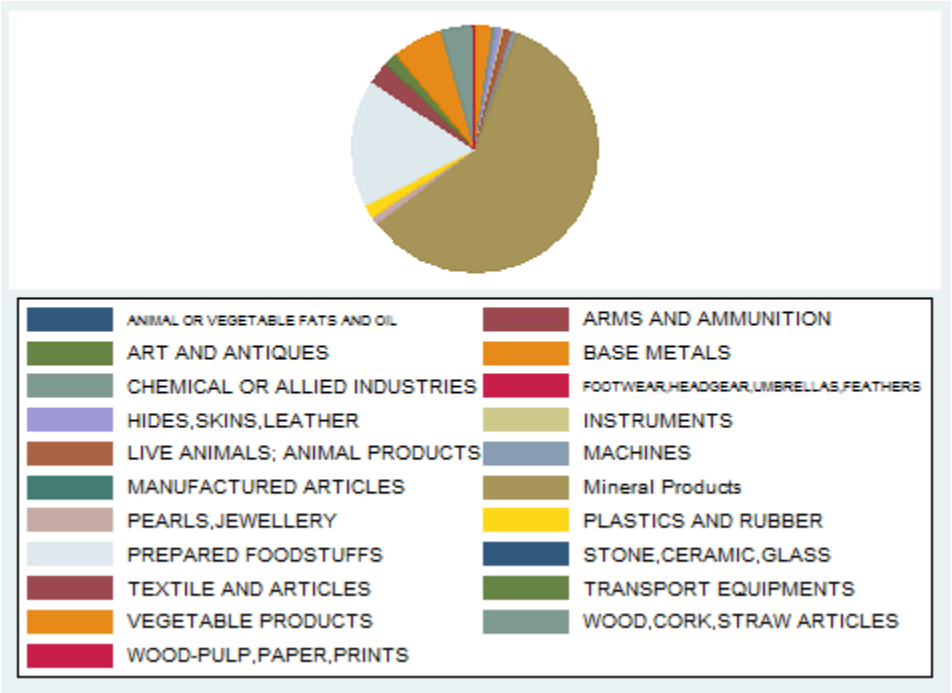
Source: Author's Calculation

Appendix 3: Distribution of LDC Exported Product Value by Industry



Source: Author's Calculation

Appendix 4: Distribution of Non LDC Exported Product Value by Industry

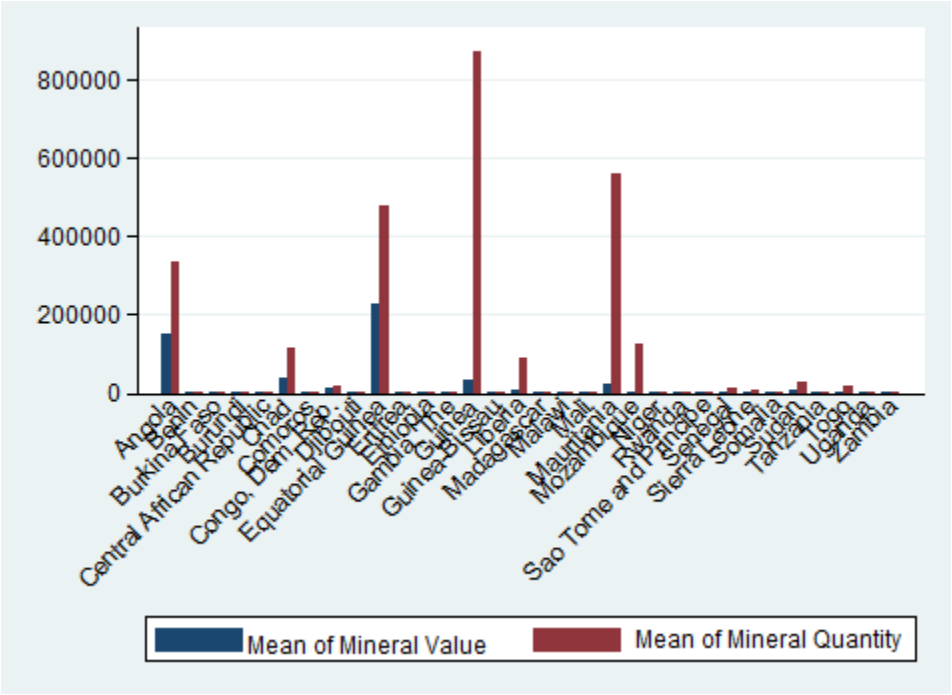


Source: Author's Calculation

Appendix 5: Table of Treatment, Control, and EU 15 countries

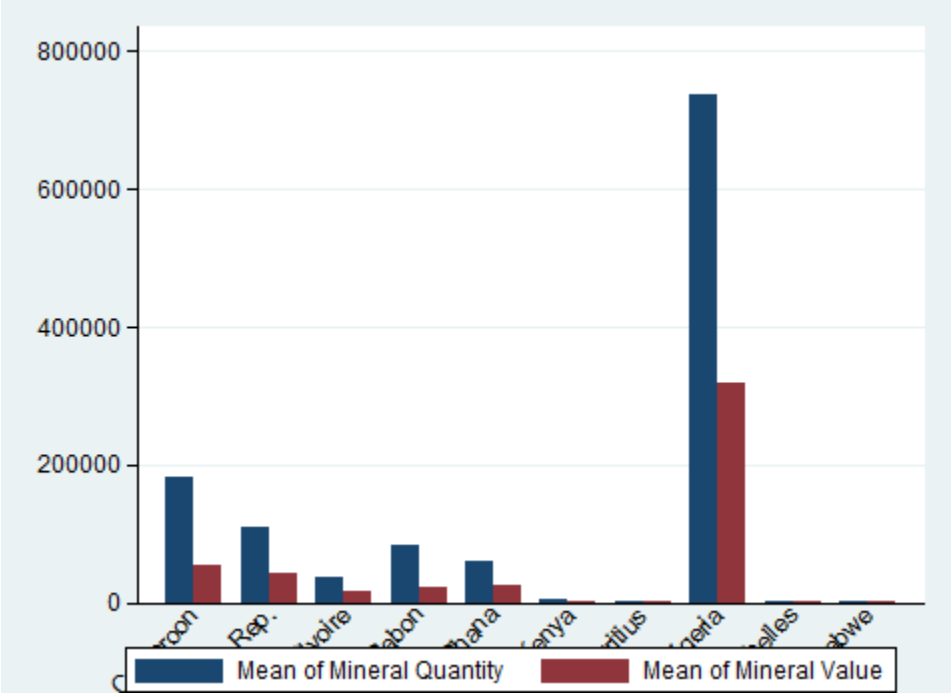
	Treatment Group		Control Group		EU 15
1	Angola	1	Cameroon	1	Austria
2	Benin	2	Congo Republic	2	Belgium
3	Burkina Faso	3	Cote d'Ivoire	3	Denmark
4	Burundi	4	Gabon	4	Finland
5	Central African Republic	5	Ghana	5	France
6	Chad	6	Kenya	6	Germany
7	Comoros	7	Mauritius	7	Greece
8	Congo, Dem. Rep.	8	Nigeria	8	Ireland
9	Djibouti	9	Seychelles	9	Italy
10	Equatorial Guinea	10	Zimbabwe	10	Luxembourg
11	Eritrea			11	Netherlands
12	Ethiopia			12	Portugal
13	Guinea			13	Spain
14	Liberia			14	Sweden
15	Madagascar			15	United Kingdom
16	Malawi				
17	Mali				
18	Mauritania				
19	Mozambique				
20	Niger				
21	Rwanda				
22	Sao Tome and Principe				
23	Senegal				
24	Sierra Leone				
25	Somalia				
26	Sudan				
27	Tanzania				
28	Togo				
28	Uganda				
30	Zambia				
31	Gambia, The				
32	Guinea-Bissau				

Appendix 6: Distribution of Mineral Product Export by SSA LDCs



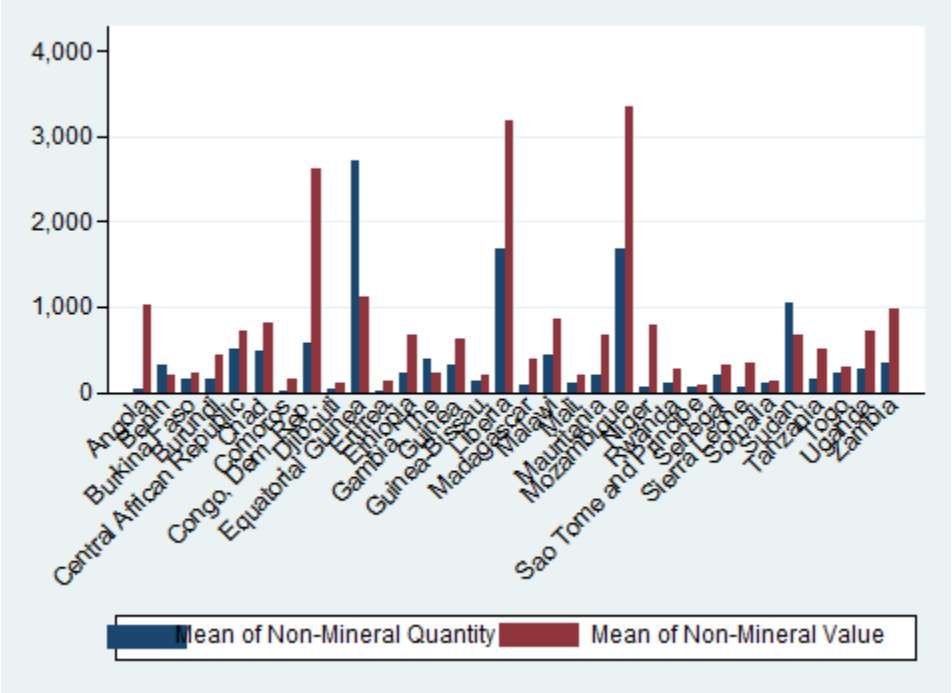
Source: Author's Calculation

Appendix 7: Distribution of Mineral Product Export by SSA Non LDCs



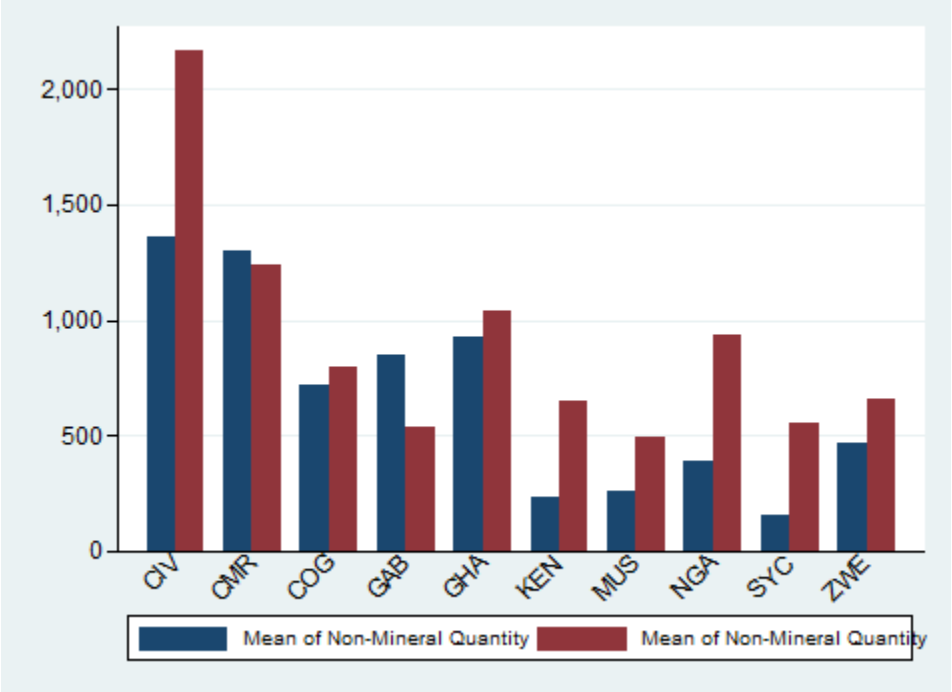
Source: Author's Calculation

Appendix 8: Distribution of Non-Mineral Product Export by SSA LDCs



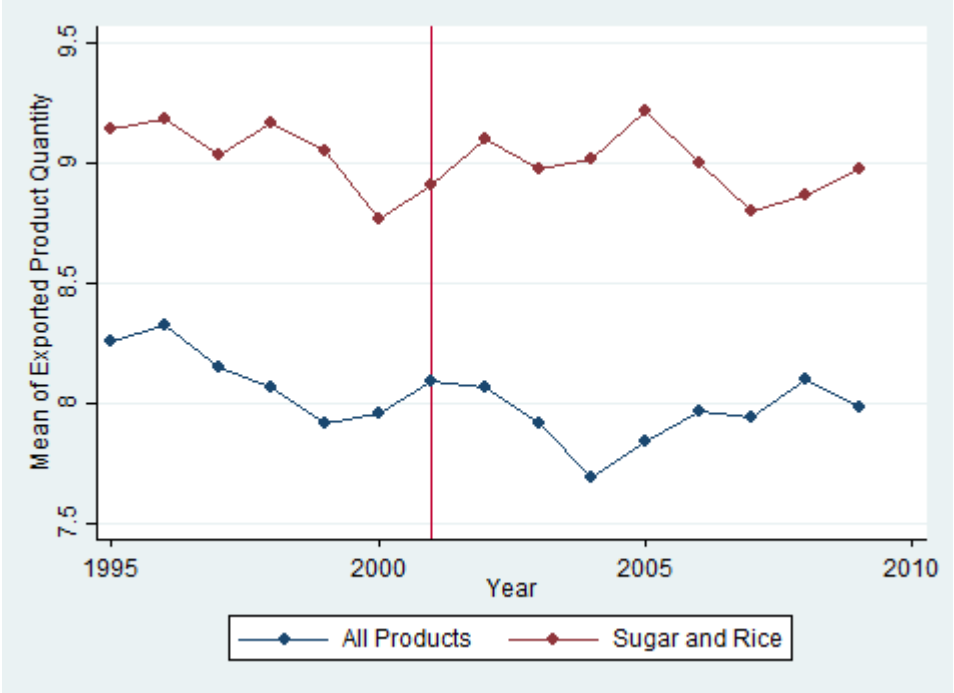
Source: Author's Calculation

Appendix 9: Distribution of Non-Mineral Product Export by SSA Non LDCs



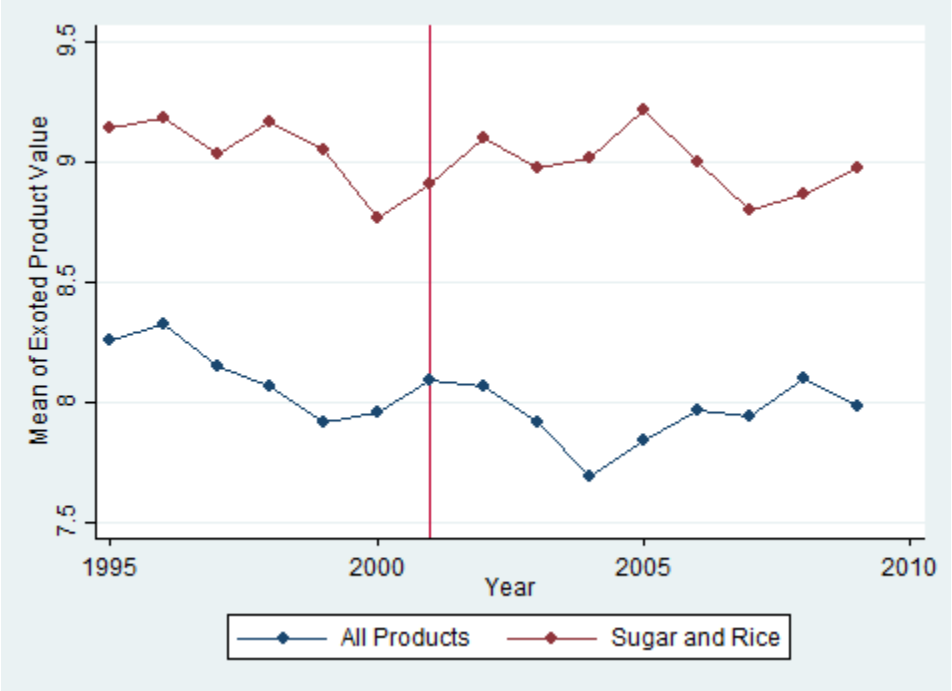
Source: Author's Calculation

Appendix 10: Trend Graph for Exported Product Quantity at Product Level (Sugar and Rice as Controls)



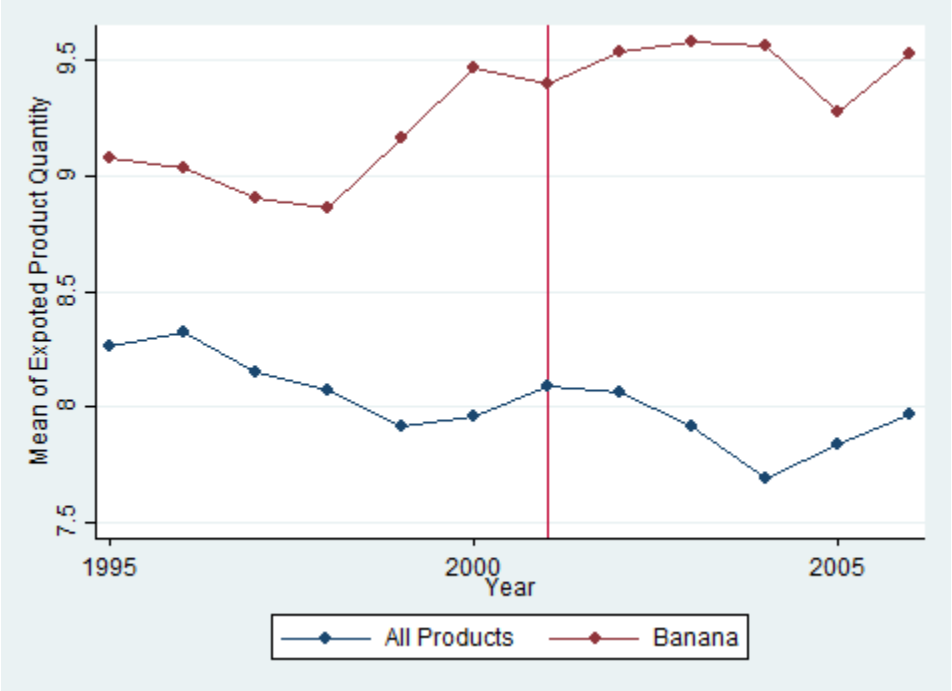
Source: Author's Calculation

Appendix 11: Trend Graph for Exported Product Value at Product Level (Sugar and Rice as Controls)



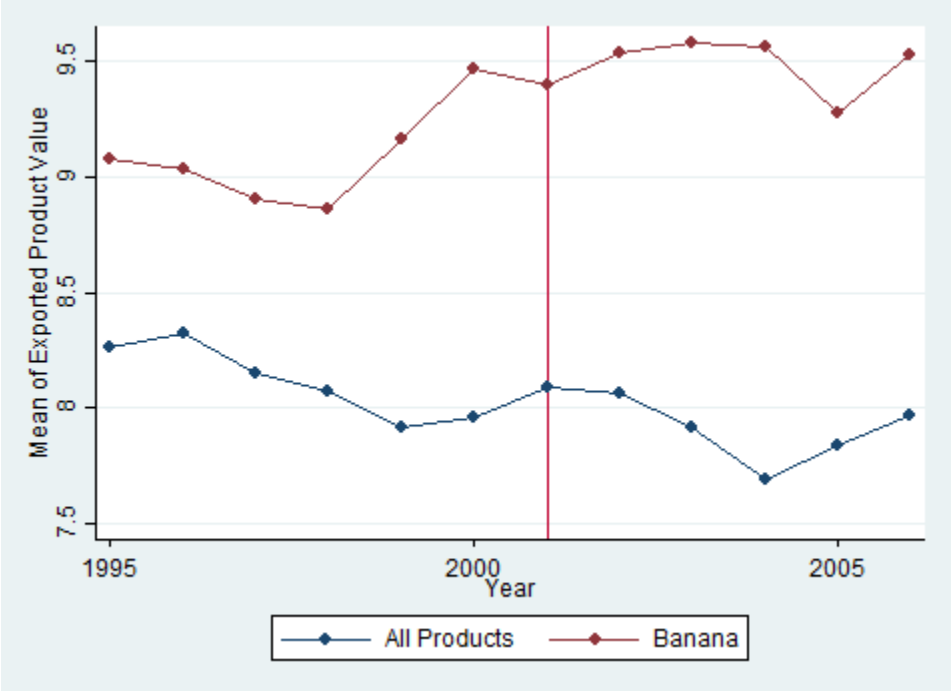
Source: Author's Calculation

Appendix 12: Trend Graph for Exported Product Quantity at Product Level (Banana as Control)



Source: Author's Calculation

Appendix 13: Trend Graph for Exported Product Value at Product Level (Banana Control)



Source: Author's Calculation

Appendix 14: Estimation Results for the Extensive margin at the Product level (Banana as Control)

	(1) DD	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE
Time Dummy	0.405					
	(0.29)					
Product Dummy	-3.474***					
	(0.18)					
EBA Treatment	-0.805**	-4.346***	-1459636.495	-4906.988	-4809.946	10111.213
	(0.29)	(0.22)	(6.03e+09)	(61988926.63)	(61988926.63)	(31304744.99)
Constant	4.498***					
	(0.18)					
Importer x Year	No	Yes	Yes	Yes	Yes	Yes
Product x Year	No	No	Yes	Yes	Yes	Yes
Product x Exporter	No	No	No	Yes	Yes	Yes
Exporter	No	No	No	No	Yes	Yes
Exporter x Importer	No	No	No	No	No	Yes
r2	0.006	0.041	0.669	0.782	0.782	0.790
N	274304	274304	264147	242425	242425	242420

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's Calculation

Appendix 15: Estimation Results for the Intensive margin at the Product level (Banana as Control)

	(1) DD	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE
Time Dummy	0.577**					
	(0.19)					
Product Dummy	-1.368***					
	(0.12)					
EBA Treatment	-0.723***	-2.151***	-891145.218	-3800.663	-4048.473	6378.485
	(0.19)	(0.15)	(5.17e+09)	(46523161.68)	(46523161.68)	(16883141.80)
Constant	4.378***					
	(0.12)					
Importer x Year	No	Yes	Yes	Yes	Yes	Yes
Product x Year	No	No	Yes	Yes	Yes	Yes
Product x Exporter	No	No	No	Yes	Yes	Yes
Exporter	No	No	No	No	Yes	Yes
Exporter x Importer	No	No	No	No	No	Yes
r2	0.002	0.021	0.444	0.626	0.626	0.641
N	281742	281742	271451	249448	249448	249443

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's Calculation

Appendix 16: Estimation Results for the Extensive margin at the Product level (Arms as Control)

	(1) DD	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE
Time Dummy	0.753					
	(0.42)					
Product Dummy	2.962***					
	(0.36)					
EBA Treatment	-1.364**	1.430***	1800854.731	-11320.209	-11441.522	-17200.765
	(0.42)	(0.22)	(5.27e+09)	(61168507.12)	(61168507.13)	(17043184.39)
Constant	-1.938***					
	(0.36)					
Importer x Year	No	Yes	Yes	Yes	Yes	Yes
Product x Year	No	No	Yes	Yes	Yes	Yes
Product x Exporter	No	No	No	Yes	Yes	Yes
Exporter	No	No	No	No	Yes	Yes
Exporter x Importer	No	No	No	No	No	Yes
r2	0.007	0.041	0.655	0.758	0.758	0.766
N	515936	515936	498734	473059	473059	473058

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's Calculation

Appendix 17: Estimation Results for the Intensive margin at the Product level (Arms as Control)

	(1) DD	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE
Time Dummy	0.646*					
	(0.27)					
Product Dummy	0.633**					
	(0.23)					
EBA Treatment	-0.734**	-0.208	-5144442.047	-665.785	-437.880	3851.703
	(0.27)	(0.15)	(4.80e+09)	(44830832.91)	(44830832.91)	(19825402.38)
Constant	2.377***					
	(0.23)					
Importer x Year	No	Yes	Yes	Yes	Yes	Yes
Product x Year	No	No	Yes	Yes	Yes	Yes
Product x Exporter	No	No	No	Yes	Yes	Yes
Exporter	No	No	No	No	Yes	Yes
Exporter x Importer	No	No	No	No	No	Yes
r2	0.000	0.020	0.444	0.607	0.607	0.620
N	525441	525441	508087	482156	482156	482155

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's Calculation

Appendix 18: Country Specific Results for the Extensive Margin of LDC exports

Country	EBA Coefficient	Standard Error	Constant	Standard Error	R-squared	observations
Angola	-0.767***	-0.1	-0.032	-0.09	0.007	9081
Benin	-0.676***	-0.09	1.389***	-0.08	0.009	6019
Burkina Faso	-0.211**	-0.06	0.185***	-0.05	0.001	9246
Burundi	-0.778***	-0.14	1.090***	-0.11	0.012	2506
Central African Republic	0.005	-0.12	0.887***	-0.09	0	3552
Chad	-2.079***	-0.28	1.347***	-0.25	0.046	1332
Comoros	-0.161	-0.11	-0.155	-0.1	0.001	2891
Congo, Dem. Rep.	-0.918***	-0.11	1.636***	-0.09	0.012	6147
Djibouti	-0.664***	-0.13	0.537***	-0.1	0.012	2043
Equatorial Guinea	-1.272***	-0.21	2.026***	-0.18	0.012	2721
Eritrea	-0.357**	-0.14	0.153	-0.11	0.003	1925
Ethiopia	-1.076***	-0.07	1.174***	-0.07	0.014	16400
Guinea	-0.619***	-0.09	1.594***	-0.07	0.006	7038
Liberia	-1.273***	-0.18	2.609***	-0.15	0.019	2796
Madagascar	-0.541***	-0.03	0.658***	-0.03	0.007	39243
Malawi	-0.815***	-0.1	1.407***	-0.08	0.011	6009
Mali	-0.077	-0.07	0.241***	-0.06	0	10004
Mauritania	-0.351**	-0.12	1.387***	-0.1	0.002	5977
Mozambique	-0.644***	-0.1	1.198***	-0.09	0.004	8815
Niger	-0.109	-0.08	-0.381***	-0.07	0	6753
Rwanda	-0.712***	-0.14	0.674***	-0.13	0.008	3418
Sao Tome and Principe	-0.888***	-0.15	0.654***	-0.12	0.019	1985
Senegal	-0.511***	-0.05	1.204***	-0.04	0.005	27662
Sierra Leone	0	-0.06	0.043	-0.05	0	10049
Somalia	-0.267	-0.18	0.400**	-0.14	0.002	1063
Sudan	-1.533***	-0.1	2.333***	-0.07	0.039	6140
Tanzania	-0.725***	-0.05	1.220***	-0.04	0.009	21965
Uganda	-0.989***	-0.07	1.243***	-0.06	0.014	13016
Togo	-0.475	0.06	1.118***	0.48	0.0001	9545
Zambia	-1.113***	-0.07	1.182***	-0.06	0.023	9501
Gambia, The	0.194*	-0.09	0.668***	-0.07	0.001	4085
Guinea-Bissau	-0.494*	-0.2	1.668***	-0.16	0.006	983

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's Calculation

Appendix 19: Country Specific Results for the Extensive Margin of LDC exports

Country	EBA Coefficient	Standard Error	Constant	Standard Error	R-Squared	Observations
Angola	-0.237***	-0.06	2.813***	-0.05	0.002	9163
Benin	-0.222***	-0.06	2.722***	-0.05	0.003	6133
Burkina Faso	0.114**	-0.04	2.368***	-0.03	0.001	9407
Burundi	-0.234*	-0.1	2.908***	-0.08	0.002	2585
Central African Republic	0.188*	-0.07	2.778***	-0.06	0.002	3691
Chad	-0.838***	-0.19	3.630***	-0.17	0.018	1343
Comoros	0.149	-0.08	2.266***	-0.07	0.001	2907
Congo, Dem. Rep.	-0.204**	-0.07	3.461***	-0.06	0.001	6443
Djibouti	0.236**	-0.08	2.347***	-0.06	0.004	2072
Equatorial Guinea	0.116	-0.13	3.326***	-0.11	0	2748
Eritrea	-0.265**	-0.09	2.606***	-0.07	0.005	1944
Ethiopia	-0.422***	-0.05	3.283***	-0.05	0.005	16516
Guinea	0.017	-0.06	3.042***	-0.04	0	7221
Liberia	-0.422***	-0.11	3.829***	-0.09	0.005	2875
Madagascar	0.031	-0.02	2.964***	-0.02	0	39600
Malawi	-0.222***	-0.06	3.244***	-0.05	0.002	6079
Mali	0.173***	-0.04	2.408***	-0.04	0.002	10143
Mauritania	-0.001	-0.07	3.330***	-0.06	0	6026
Mozambique	0.172**	-0.06	3.046***	-0.05	0.001	9317
Niger	-0.109	-0.08	-0.381***	-0.07	0	6753
Rwanda	-0.273**	-0.09	2.917***	-0.08	0.003	3470
Sao Tome and Principe	-0.103	-0.09	2.347***	-0.08	0.001	1995
Senegal	-0.175***	-0.03	2.954***	-0.03	0.001	27821
Sierra Leone	0.161***	-0.04	2.483***	-0.03	0.001	10217
Somalia	-0.225	-0.12	2.661***	-0.09	0.004	1071
Sudan	-0.478***	-0.06	3.620***	-0.05	0.01	6193
Tanzania	-0.085**	-0.03	3.117***	-0.03	0	22355
Togo	0.179***	0.04	2.55	0.03	0.001	9744
Uganda	-0.256***	-0.05	3.164***	-0.04	0.002	13116
Zambia	-1.113***	-0.07	1.182***	-0.06	0.023	9501
Gambia, The	-0.123**	-0.05	3.190***	-0.04	0.001	10013
Guinea-Bissau	-0.001	-0.06	2.336***	-0.05	0	4218

Appendix 20: Impact of the EBA on Specific industry for the Extensive margin

Industry	**EBA**	**Standard Error**	**Constant**	**Standard Error**	R-sq	N
ANIMAL OR VEGETABLE FATS AND OILS	-0.852***	-0.09	3.471***	-0.05	0.021	4246
ART and ANTIQUES	0.089	-0.07	-1.300***	-0.06	0	4611
CHEMICAL OR ALLIED INDUSTRIES	-0.391***	-0.05	0.504***	-0.03	0.004	16871
FOOTWEAR, HEADGEAR,UMBRELLAS,FEATHERS	0.238***	-0.06	-0.760***	-0.03	0.003	6051
HIDES, SKINS, LEATHER	-0.096	-0.05	0.762***	-0.03	0	13649
INSTRUMENTS	-0.217***	-0.03	-2.636***	-0.02	0.002	27927
LIVE ANIMALS; ANIMAL PRODUCTS	0.120***	-0.03	1.699***	-0.02	0	29382
MACHINES	-0.193***	-0.02	-1.567***	-0.01	0.001	100195
MANUFACTURED ARTICLES	-0.094**	-0.03	-0.290***	-0.02	0	17499
Mineral Products	-0.689***	-0.1	5.805***	-0.06	0.005	9846
PEARLS, JEWELLERY	0.159*	-0.07	-2.567***	-0.05	0.001	7067
PLASTICS AND RUBBER	-1.427***	-0.05	1.997***	-0.03	0.041	14739
PREPARED FOODSTUFFS	-0.746***	-0.04	3.589***	-0.02	0.012	28838
STONE, CERAMIC, GLASS	-0.374***	-0.06	0.422***	-0.03	0.005	8101
TEXTILE AND ARTICLES	-0.191***	-0.02	0.307***	-0.01	0.001	73586
TRANSPORT EQUIPMENTS	-0.009	-0.04	0.194***	-0.02	0	18919
VEGETABLE PRODUCTS	0.027	-0.02	2.658***	-0.01	0	62126
WOOD, CORK, STRAW ARTICLES	-1.642***	-0.04	3.750***	-0.02	0.05	29779
WOOD-PULP, PAPER, PRINTS	-0.257***	-0.05	0.245***	-0.03	0.002	11286

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's Calculation

Appendix 21: Impact of the EBA on Specific Industry for the Intensive Margin

Industry	EBA	Standard Error	Constant	Standard Error	R-sq	N
ANIMAL OR VEGETABLE FATS AND OILS	-0.331***	-0.07	3.797***	-0.05	0.005	4258
ART and ANTIQUES	-0.081*	-0.04	2.061***	-0.03	0.001	6071
CHEMICAL OR ALLIED INDUSTRIES	-0.01	-0.03	2.523***	-0.02	0	17089
FOOTWEAR,HEADGEAR,UMBRELLAS,FEATHERS	0.359***	-0.05	1.998***	-0.03	0.01	6123
HIDES, SKINS, LEATHER	-0.129***	-0.04	3.259***	-0.02	0.001	13763
INSTRUMENTS	-0.134***	-0.02	2.218***	-0.01	0.002	28725
LIVE ANIMALS; ANIMAL PRODUCTS	0.331***	-0.03	3.519***	-0.02	0.005	29602
MACHINES	-0.025*	-0.01	2.154***	-0.01	0	101100
MANUFACTURED ARTICLES	-0.146***	-0.02	2.041***	-0.02	0.002	17598
Mineral Products	-0.255***	-0.08	5.216***	-0.05	0.001	9950
PEARLS, JEWELLERY	0.087	-0.05	3.409***	-0.03	0	10304
PLASTICS AND RUBBER	-0.951***	-0.04	3.427***	-0.03	0.034	14791
PREPARED FOODSTUFFS	-0.409***	-0.03	4.255***	-0.02	0.005	28956
STONE, CERAMIC, GLASS	-0.183***	-0.03	1.922***	-0.02	0.004	8174
TEXTILE AND ARTICLES	-0.168***	-0.02	3.100***	-0.01	0.001	74181
TRANSPORT EQUIPMENTS	-0.007	-0.03	2.832***	-0.02	0	19195
VEGETABLE PRODUCTS	0.183***	-0.02	3.473***	-0.01	0.001	62347
WOOD, CORK, STRAW ARTICLES	-1.066***	-0.03	4.120***	-0.02	0.038	30473
WOOD-PULP, PAPER,PRINTS	-0.172***	-0.03	2.157***	-0.02	0.002	11350

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's Calculation

Appendix 22: Robustness Test with Control Variables

	(1) Extensive Margin	(2) Intensive Margin
Exporter Population	0.317	0.900*
	(0.51)	(0.37)
Importer Population	3.512	-2.996
	(6.79)	(2.77)
Political Rights	0.006	0.040
	(0.04)	(0.03)
Infrastructure	-0.019	-0.006
	(0.01)	(0.01)
simple distance	0.032	-0.049
	(354.47)	(440.34)
colonial relationship	57.799	16.083
	(1792117.52)	(1326222.18)
common language	-57.516	-94.651
	(1711888.25)	(1361286.97)
EBA Dummy	0.017	-0.045
	(0.04)	(0.03)
Importer x Year	Yes	Yes
Product x Year	Yes	Yes
Product x Exporter	Yes	Yes
Exporter	Yes	Yes
Exporter x Importer	Yes	Yes
r2	0.765	0.621
N	455412.000	463848.000

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Author's Calculation

Appendix 23: Robustness Test for the Extensive Margin Without Nigeria

	(1) DD	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE
Time Dummy	-0.541***					
	(0.02)					
Country Dummy	-0.083***					
	(0.02)					
EBA	-0.084***	-0.243***	-0.270***	-0.001	-0.001	0.025
	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.04)
Constant	1.037***					
	(0.01)					
Importer x Year	No	Yes	Yes	Yes	Yes	Yes
Product x Year	No	No	Yes	Yes	Yes	Yes
Product x Exporter	No	No	No	Yes	Yes	Yes
Exporter	No	No	No	No	Yes	Yes
Exporter x Importer	No	No	No	No	No	Yes
R-squqred	0.007	0.041	0.657	0.760	0.760	0.768
N	483961	483961	466713	441992	441992	441991

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix 24: Robustness Results for the Intensive Margin without Nigeria

	(1) DD	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE
Year Dummy	-0.107***					
	(0.01)					
Country Dummy	-0.158***					
	(0.01)					
EBA	0.047***	-0.146***	-0.232***	0.034**	0.034**	0.054
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)
Constant	3.076***					
	(0.01)					
Importer x Year	No	Yes	Yes	Yes	Yes	Yes
Product x Year	No	No	Yes	Yes	Yes	Yes
Product x Exporter	No	No	No	Yes	Yes	Yes
Exporter	No	No	No	No	Yes	Yes
Exporter x Importer	No	No	No	No	No	Yes
R-squared	0.001	0.020	0.444	0.605	0.605	0.619
N	492843	492843	475465	450493	450493	450492

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Authors Calculation